AN INVESTIGATION OF SOCIO-CULTURAL PRACTICES AND DIETARY PATTERNS, THE PRESENCE OF DOUBLE BURDEN OF MALNUTRITION IN CHILDREN AND THEIR MOTHERS IN GRAND-POPO, BENIN

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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

AN INVESTIGATION OF SOCIO-CULTURAL PRACTICES AND DIETARY PATTERNS, THE PRESENCE OF DOUBLE BURDEN OF MALNUTRITION IN CHILDREN AND THEIR MOTHERS IN GRAND-POPO, BENIN

Aim

The aim of this study was to investigate the sociocultural influence, feeding practices and the presence of double burden of malnutrition in children and their mothers in Grand-Popo's community, Benin.

Methods

A cross-sectional, descriptive and analytical approach was used. A sample of 408 children between the ages of 0 to 59 months and their mothers were randomly selected. A questionnaire was developed to compile information on demographic and socio-economic status of the household, breastfeeding, and infant feeding practices. A food frequency questionnaire was administrated to assess dietary patterns and four focus groups with mothers were held to determine care practices and food taboos. Weight and height measurements for children and weight, height, and waist circumference for their mothers were taken. Height for age and weight for height z-scores were determined for the children and Body Mass Index (BMI) measurements were calculated for the mothers. For statistical analysis, IBM SPSS version 25 was used. Descriptive and regression analysis were carried out on the data to investigate relationships between the various factors and presence of double burden of malnutrition.

Results

Seven districts, in two different areas (rural and peri-urban), with 68.9% of households in rural areas, were surveyed. The mean age of children was 24.45 ± 14.9 months, of which 53.2% was girls. The mean age of mothers was 27.99 ± 6.99 years. The majority of mothers (93.1%) were married or living with their partners. In 96.3% of households, the man is the head. Approximately 91.7% households had a monthly income of $60 (± 760 ZAR) and spent, on average $24 ± $11.2 (R305 – R445) on food. Prevalence of wasting found in children was 9.8% and stunting was 29.7%. Waist circumference mean of mothers was 79.95±10.35 cm and 19.3% were classified to be at high metabolic risk. BMI was also evaluated; 16.9% of mothers were overweight and 7.4% obese. All the children were breastfed, and 56.1% of children under six months received breast milk exclusively. Children were introduced to family foods at five months with very low

consumption of animal protein and fruits. Mothers and children had monotonous diets with high consumption of vegetables and maize based meals. In the community surveyed, food taboos particularly during pregnancy, were revealed. Those cultural beliefs were still followed by some mothers and food rich in nutrients were pushed aside.

Conclusion

Stunting as well as wasting were highly prevalent in this study population, while mothers' obesity prevalence could not be ignored. The results drew attention to the need for more effort in interventions to reduce undernutrition, but also to coordinate preventive interventions to stop obesity advance.

OPSOMMING

'N ONDERSOEK NA SOSIO-KULTURELE PRAKTYKE EN EETPATRONE, DIE VOORKOMS VAN DIE DUBBELE LAS WEENS WANVOEDING ONDER KINDERS EN HUL MOEDERS IN GRAND-POPO, BENIN

Doel

Die doel van hierdie studie was om die sosio-kulturele invloed, voedingspraktyke, en die teenwoordigheid van die dubbele las van wanvoeding by kinders en hul moeders in die Grand-Popo gemeenskap in Benin te ondersoek.

Metodes

'n Deursnit, beskrywende en analitiese benadering is gebruik. 'n Steekproef van 408 kinders tussen die ouderdomme van 0 to 59 maande en hul moeders is lukraak gekies. 'n Vraelys is ontwikkel om inligting oor die demografiese en sosio-ekonomiese status van die huishouding, asook borsvoeding-, en babavoedingspraktyke te versamel. 'n Voedsel- frekwensie vraelys is voltooi om dieetpatrone te bestudeer. Vier fokusgroepe met moeders is gehou om versorgingspraktyke en voedseltaboes te bepaal. Kinders se gewig en lengte is gemeet en hul moeders se gewig, lengte en middellyf omtrek bepaal. Lengte- vir-ouderdom en gewig- vir- lengte z-tellings is bepaal vir kinders, en liggaamsmassa indeks (LMI) metings is vir moeders bereken. Vir statistiese analise is die IBM SPSS weergawe 25 gebruik. Beskrywende en regressie-analise is uitgevoer op die data om die verhoudings tussen die verskillende faktore en die teenwoordigheid van die dubbele las van wanvoeding, te ondersoek.

Resultate

Huishoudings in sewe distrikte, in twee verskillende gebiede (landelik en buitestedelik) was ondervra, waarvan die meerderheid (68,9%) in landelike gebiede woonagtig is. Die gemiddelde ouderdom van die kinders is 24,45 ± 14,9 maande en 53,2% is vroulik. Die gemiddelde ouderdom van moeders is 27,99 ± 6,99 jaar. Die meerderheid moeders (93.1%) was getroud of het saam met hul gade gewoon. In 96,3% huishoudings was die man die hoof broodwinner. Ongeveer 91,7% huishoudings het 'n maandelikse inkomste van $ 60 (± 760 ZAR) gehad waarvan daar gemiddeld $ 24 ± $ 11.2 (R305 tot R445) op kos spandeer is. Die voorkoms van uittering onder die kinders was 9.8% en dwerggroei was 29.7%. Moeders se gemiddelde totale middelomtrek was 79,95 ± 10,35cm en 19,3% is geklassifiseer om in die groep te val wat 'n hoë metaboliese risiko het. LMI is ook geëvalueer: 16,9% moeders was oorgewig en 7,4% vetsugtig. Al die kinders was

geborsvoed, 56,1% kinders jonger as ses maande is eksklusief geborsvoed. Kinders was teen vyf maande bekendgestel aan gesinsvoedsel met ‘n baie lae inname van dierlike proteïene en vrugte. Moeders en kinders het eentonige diëte gevolg, wat hoofsaaklik bestaan het uit groente en mielie-gebaseerde etes. Voedsel taboes in hierdie gemeenskap speel veral ‘n rol tydens swangerskap. Hierdie kulturele oortuigings word steeds deur sommige moeders uitgeleef dus word voedsel wat ryk is aan voedingstowwe opsy geskuif.

Gevolgtrekking

Beide dwerggroei en uittering is baie algemeen in hierdie studiepopulasie, terwyl die voorkoms van vetsugtigheid onder moeders nie geïgnoreer kan word nie. Die resultate vestig nie net die aandag op die behoefte dat daar meer moeite gedoen moet word met intervensies om wanvoeding te verminder nie, maar dat voorkomende intervensies om toenemende vetsugtigheid te verminder, gekoördineerd moet plaasvind.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMNS

AGVSAN : Analyse Globale de la vulnérabilité, de la sécurité alimentaire et de la nutrition (Global Analysais of the Vulnérabilité, Food Security and Nutrition)

AUC: African Union Commission

BAZ: BMI-for-Age z-score

BMI: Body Mass Index

DBM: Double Burden of Malnutrition

DHS: Demographic and Health Survey

EED: Environmental Enteric Dysfunction

FAO: Food and Agriculture Organisation

GDP: Gross Domestic Product

HAZ: Height-for-Age z-score

ICN: International Conference on Nutrition

IFPRI: International Food Policy Research Institute

IQ: Intellectual Quotient

MDG: Millennium Development Goals

NEPAD: New Partnership for Africa's Development

SDG: Sustainable Development Goals

SSA: Sub Saharan Africa

UNICEF: United Nations Children's Fund

WASH: Water, Hygiene and Sanitation

WAZ: Weight-for-Age z-score

WC: Waist Circumference

WFP: World Food Program

WHO: World Health Organisation

DEFINITION OF TERMS

The operational terms used in the study are defined in this list.

Socio-cultural practices: A set of beliefs, customs, practices and behaviour that exists within a population. Research often include an examination of the socio-cultural environment prior as part of understanding the population.

Dietary patterns: Dietary patterns reflect whole foods and/or combinations of consumption, temporal distribution of intake and habitual patterns in a household (e.g. snacking and food preparation methods).

Double burden of Malnutrition: According to WHO (2009) the double burden of malnutrition is characterized by the coexistence of undernutrition along with overweight, obesity or diet-related NCDs, within individuals, households and populations, and across the life-course. For this study, the definition of double burden of disease was limited to the co-existence of undernutrition and overnutrition.

Rural and urban areas in Benin: For this research rural areas are characterised by low level of development for example poor roads, mainly gravel and also under traditional ruling by chiefs. While urban have tar road infrastructure and towns and mainly under the democratic ruling system but still dominated by informal housing structures.

CHAPTER 1: INTRODUCTION

1.1 Introduction

Malnutrition, in every form, presents a significant threat to human health. It is an enormous public health problem with 45% of children deaths attributed to undernutrition (Black et al, 2013). Hunger and inadequate nutrition contribute to high mortality rates in children and mothers, and low growth and brain development during the childhood. At the same time, the high rate of overweight and obesity in the world is linked to the rise of chronic diseases such as cardiovascular disease and diabetes - conditions that are life-threatening and overburdened.

The world faces today a double burden of malnutrition which includes both undernutrition and overweight, especially in developing countries. Managing these two aspects of malnutrition in developing countries is a heavy burden for their failing health systems. Data from Food and Agriculture Organisation (FAO) show that 161 million children under five years are stunted, at the same time 3.4 million people die each year due to overweight and obesity. The cost of managing malnutrition is about $ 3.5 trillion USD per year (FAO, 2013).

Underweight is one of major factors contributing to the burden of the disease in sub-Saharan Africa, and the fourth in South Asia. The West African region is already facing the high prevalence of chronic malnutrition and its many consequences, not only on young children, but also on the nation (Bain et al., 2013). On average, 30% of children under five years of age in this region are stunted (IFPRI, 2016). Malnutrition is declining in some countries and stagnating or increasing in others (UNICEF, WHO, World Bank Group, 2017). Despite many commitments made at international meetings, the involvement of public policies remains weak. The rising prevalence of obesity among adults, as well as among young people, is worrying and shows the necessity to find the right strategy to solve different aspects of malnutrition in the same population. How to treat two extreme situations in a health system that still encounters many problems in its performance, is the great question. The same situation arises in other developing countries, such as in Asia and Latin America.

Malnutrition among children can start very early in life. When children get poor nutrition in the womb during pregnancy, their bodies are "pre-programmed" to manage with minimal intake of nutrition. Due to this pre-programming during the pregnancy phase, these children become prone

to obesity as their bodies - conditioned to manage with less intake - consume more food. Obesity leaves them more prone to non-communicable diseases, including diabetes and heart diseases.

In most developing populations, the lifestyle is in transition. Traditional foods are abandoned for processed, fast foods and people are more sedentary (Zeba, 2012). That is relevant for overweight and obesity. The double burden of nutrition is the new public health challenge in most countries, where undernutrition and overnutrition occurs simultaneously. The double burden of malnutrition has been observed at country, household, and even individual level (Grijalva-Eternod et al., 2012; Laillou et al., 2014).

Benin is a developing country located in West Africa, which have experienced a very fast urban development over the last years: an urbanisation rate of 43.5% in the last census was reported (RGPH, 2014). Although the data are not always available, there are indications that undernutrition and overweight have started to become a serious public health problem in Cotonou (largest city of Benin). The Global Analysis of the Vulnerability, Food Security and Nutrition report (AGVSAN) has reported a prevalence of obesity at 7% in women (AGVSAN, 2009). Ntandou-Bouzitou (2005) observed stunting in children and overweight or obesity of the mother in 17% households in disadvantaged areas of Cotonou, thus showing a double burden of malnutrition at household level.

1.2 Problem statement

According to World Health Organisation (WHO)/ United Nations Children's Fund (UNICEF) (2017) there were about 94.5 million underweight children globally in 2016. Additionally, it was estimated that 40.6 million children under five years of age are overweight worldwide (UNICEF, WHO, World Bank Group, 2017), and over 650 million adults were clinically obese (GHO, 2017). The double burden of malnutrition refers to undernutrition and overnutrition simultaneously occurring within a household or population. In Sub-Saharan Africa, these are risk factors for chronic diseases and children's development. In one part, there is persistent undernutrition delaying the growth of children, leading to death in some of them, and at the same time, overnutrition with risks on the quality of life of people. The national prevalence of undernutrition among children in Benin was 44.7% in 2011 (INSAE, 2012) and the prevalence of overweight among adult women was 38% (IFPRI, 2015). Lack of data in Benin is one of the challenges limiting decisions. There is a need to assess the double burden situation in Benin. Hence this study on the socio-cultural

aspects of double burden of malnutrition in Benin which will bring more light on the situation and contributing factors.

1.3 Study motivation

The co-existence of underweight and overweight is a public health challenge that is real. Factors influencing nutrition transition in adults in Benin should be studied from the perspective of public health. Policy development to halt the progression of obesity in both children and their mothers, all the while still addressing undernutrition is important. There is little data about undernutrition and overweight/obesity of children and mothers, in Benin, available. This study thus aims to supplement existing data. The study will contribute to understanding the relationship between socio-cultural practices and nutritional status, and to understand the determinants of double burden malnutrition in this specific context. It is also an opportunity to draw a nutrition profile of Grand-Popo, Benin.

1.4 Study aim and objectives

1.4.1 Research aim

The aim of this study is to investigate the socio-cultural practices, dietary patterns and the presence of malnutrition in children and their mothers in Grand-Popo, Benin

1.4.2 Objectives

The specific objectives are:

a) Determine socio-demographic and household parameters,

b) Determine the nutritional status of Beninese children under five and their mothers, using anthropometric measurements,

c) Determine the co-existence of double burden of malnutrition,

d) Determine dietary patterns of children and their mothers/caregivers using a general questionnaire and a food frequency questionnaire,

e) Determine food socio-cultural practices using focus group discussions,

f) Determine the relationship between socio-cultural practices, anthropometric measurements and eating patterns, socio demographic, household and co-existence of double burden malnutrition.

1.5 Hypothesis

a) There is coexistence of underweight and overweight in Grand-Popo, Benin.

b) There is a positive relationship between socio-demographic factors, nutritional status of children and mothers, dietary patterns and socio-cultural practices.

1.6 Significance of study

This research is important since there is need to have revised and updated data on malnutrition in Benin's communities. Being acquainted with the recent diet and its influence on the nutritional status of the most vulnerable sections of the population is of utmost importance to gain a better understanding of overall circumstances. This will assist in decision-making on maternal and child health to have a more significant impact for interventions. Consequences of malnutrition are well documented. Both under-nutrition and obesity among children and obesity among adults have been investigated in different studies, but the question is if Benin can manage both problems at the same time. How could it be dealt with? There are many research questions that need to be resolved.

1.7 Outline of the dissertation

This thesis is divided into seven chapters. The structure does not follow the traditional convention due to the use of mixed methods. Chapter one is Introduction, where the background of the study is presented. The review of literature is the second chapter. The research methods are presented in chapter three. Chapter four reports the quantitative results comprising the descriptive profiles, and the factor associations tested. In the fifth chapter the qualitative results are presented, interpreted and synthesized. Chapter six presents the discussion of the findings and summary of main observations. The last chapter seven presents concluding remarks for all work, limitations and recommendations for future research. References are listed at the end, followed by all appendices.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Malnutrition continues to be a major health burden in developing countries. Globally it is the most important risk factor for illness and death. Every country is facing a serious public health challenge relating to malnutrition (IFPRI, 2014). Progress is being made to eradicate malnutrition, but authorities remain rather unhurried while undernutrition continues to wreak havoc among children and adult overweight and obesity are increasing. Many studies have been carried out on malnutrition and despite the various advocacy of institutions such as World Health Organisation (WHO), Food and Agriculture Organization (FAO) and many other organisations, more work need to be done to achieve the Sustainable Development Goals (SDGs).

2.2 Malnutrition

Malnutrition is defined as an imbalance (deficiency or excess) in the energy and/or nutritional intake of a person. It covers three major groups according to the WHO growth reference (WHO, 2006; WHO, 2017):

- Undernutrition, which includes wasting (low weight/height ratio), stunting (low height/age ratio) and underweight (low weight/age),
- Micronutrient malnutrition, which includes micronutrient deficiency (lack of essential vitamins and minerals) or excess micronutrients,
- Overweight, obesity, and non-communicable diseases related to many diet related diseases: heart disease, stroke, diabetes, and some cancers.

Malnutrition is a major public health problem. It contributes to the high death rate among children in developing countries. According to WHO statistics, nearly half of all deaths in children under the age of five are attributable to undernutrition (WHO, 2017). Between 2000 and 2016, the prevalence of stunting globally declined from 32.7% to 22.9%, and the number of children affected fell from 198.4 million to 154.8 million (UNICEF, WHO, World Bank Group, 2017). But the prevalence of stunting appears to have increased in western and central Africa from 23.0 million to 28.1 million (UNICEF, WHO, World Bank Group, 2017). In 2016 globally, 52 million children under the age of five were wasted with one quarter thereof in sub-Saharan Africa (UNICEF, WHO, World Bank Group, 2017). Worldwide, in 2016, 41 million children under the age five were overweight, an increase, from 30 million in 2000 (UNICEF, WHO, World Bank Group, 2017).

Trends suggest that this number will continue to rise. The figures for sub-Saharan Africa do not seem to be acceptable. Malnutrition can lead to lower learning abilities in children, compromise their future, and make the cycle of poverty and malnutrition perpetuate from generation to generation with consequences for the individual, and the nation.

Poor nutrition in the first 1,000 days of a child's life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance (UNICEF, 2014). Rapid growth during pregnancy, breastfeeding, diversification in the one to three years period, lead to specific nutritional needs during each of these stages (Cusick & Georgieff, 2016). It is crucial to ensure access to optimal nutrition for each mother and child for the first 1000 days of the child's life. The period of pregnancy and lactation and the first two years of life is a special nutritional challenge for those in need of nutrition or with inappropriate feeding practices (COFA, 2015*)*. Young children need adequate dietary intake (through exclusive breastfeeding followed by quality complementary feeding) to support the rapid rate of growth that occurs in the first two years of life. Inadequate feeding and care practices often lead to a rapid decline in nutritional status after birth, and more prominently after three to four months of age (when other foods beyond just breast milk are typically introduced).

Numerous studies have shown the importance of these first 1000 days on growth, chronic disease development, cognitive development, and work capacity in adult life (Wrottesley et al., 2015; Cusick & Georgieff, 2016). The 1000 days is a window of opportunity for health and development, which need to be strengthened to ensure a better chance for children to live beyond the first year of life. Malnutrition can continue from generation to generation in a cycle driven by poverty. A child born to a mother who is undernourished will likely be born with low birth weight and has an increased risk of high morbidity and mortality. If the infant survives, and the mother is not able to adequately care for the child or adequate, quality food is not available or accessed, his/her growth will be impaired, resulting in stunting, poor cognitive abilities and increased susceptibility to infectious diseases, and later in life, to non-communicable diseases. As the child grows, his/her chances of escaping this nutrition-poverty trap diminish. Stunting can be irreversible, and the options for better education attainment and delaying marriage decrease. Stunted woman will in turn, give birth to a baby with a low birth weight, and the cycle begins again. This cycle must be broken and it all begins with the mothers of child bearing age or more importantly, adolescent girls, to adequately educated them, for when they themselves become mothers.

Malnutrition in all its forms, imposes unacceptably high financial costs directly and indirectly on individuals, families and nations. The estimated impact on the global economy could be as high as US $ 3.5 trillion per year, or US $ 500 per individual (Glopan, 2017). Adult earnings are said to be reduced by 2.4% for every 1% loss in potential attained height. Further costs are incurred through impaired learning, poor school performance, compromised adult labour productivity, and increased health care costs (Glopan, 2017). Overnutrition also bears a significant cost at least US $1.4 trillion in 2010 and about 2.6 million people die each year because of being overweight or obese (FAO, 2013, Glopan, 2017). The cost of malnutrition is high but investing in solutions can improve long term nutritional outcomes. Recent research showed that investing US $1.2 billion annually in micronutrient supplements, food fortification and biofortification of staple crops for five years, would generate annual benefits of US $15.3 billion, a benefit-to-cost ratio of almost 13 to 1. This could result in better health, fewer deaths and increased future earnings (FAO, 2013).

2.3 Risk factors of malnutrition

Malnutrition and specifically under-nutrition of children under five years of age is linked to infectious diseases, household size and feeding practices (Asfaw et al., 2015). Studies have also shown that economic status (Medhin et al., 2010; Dominguez-Salas et al., 2016), place of residence (Medhin et al., 2010; Wondaferash et al., 2012), education of the mother (Wondaferash et al., 2012; Rose et al., 2015), age of the mother (Wondaferash et al., 2012; Fentaw et al., 2013), occupation of the mother (Wondaferash et al., 2012), source of water (Medhin et al., 2010; Wondaferash et al., 2012), availability of latrine (Medhin et al., 2010, Rose et al., 2015), child morbidity (Demissie et al., 2013), sex of the child (Medhin et al., 2010, Wondaferash et al., 2012), age of the child (Endris et al., 2017), method of feeding (Haroon et al., 2013; Rose et al., 2015), age of initiation of complementary feeding (Haroon et al., 2013; Rose et al., 2015), birth interval of the child (Medhin et al., 2010; Wondaferash et al., 2012), total number of children ever born to the mother (Demissie et al., 2013) and maternal nutritional status (Medhin et al., 2010; Wondaferash et al., 2012) were factors associated with undernutrition among children under five years of age.

A study in Bangladesh showed that the low percentage of exclusive breastfeeding for 6 months and inadequate complementary feeding was associated with malnutrition (Ahmed et al., 2012). Poor maternal education is significantly associated to child nutritional status. In Pakistan, a study among Pakistani primary school children reported this relationship (Mushtaq et al., 2011). Another study has used the 3rd Indian National Family Health Survey to assess contribution of some factors

to child chronic undernutrition in India. Maternal Body Mass Index (BMI), education, household wealth, and dietary diversity were highly related to child nutrition and explained the burden of undernutrition among stunted/underweight children (Corsi et al., 2015).

For overweight/obesity, contributory risk factors include diet, lifestyle, demographic and socio-economic characteristics and living environment. There are studies that have assessed these risks in low and middle income countries (Roemling et al., 2012, Diana et al., 2013, Rachmi et al., 2017, Desalew, 2017). Age is said to be a risk factor for overweight thus, children and adolescents are more exposed to overweight than those of older ages (Rachmi et al., 2017). Parents of high economic level (Desalew et al., 2017; Rachmi et al., 2017), prefer sweetened foods, do not engage in regular physical exercise, experienced sedentary life style and spent their free time watching TV (Desalew, 2017) whereas an elevated level of education is also positively related to overweight in children and adolescents (Rachmi et al., 2017). In adults, being overweight or obese is related to gender, being a woman (Sari et al., 2012; Sari et al., 2014), being married (for women) (Roemling et al., 2012, Diana et al., 2013, Sari et al., 2014) high incomes (Roemling et al., 2012, Diana et al., 2013, Sari et al., 2014, Gbary et al., 2014) and age. Sedentary lifestyle (Roemling et al., 2012; Diana et al., 2013) with less physical activities, spending time in front of TV, having an elevated level of education, type of occupation (Gbary et al., 2014) and consuming a lot of meat and dairy products (Roemling et al., 2012) are also positively associated with high BMI. Similarly, the chance of being overweight or obese in adults aged 19 to 55 years was significantly higher in those living in urban areas (Diana et al., 2013; Sari et al., 2014).

2.4 Anthropometry indicators

Anthropometry is a non-invasive technique to access the body's proportions and composition. Anthropometric measurements reflect nutritional status and health as the survival of the individual. Three indicators are often used to characterise nutritional status of children under five years of age.

2.4.1 Underweight

The underweight indicator is the proportion of children under five years of age falling below minus two standard deviations (moderate and severe) and minus three standard deviations (severe) from the median weight-for-age of the reference population (WHO, 2009). Underweight is a composite

indicator and may therefore be difficult to interpret. The underweight indicator has the potential to capture aspects of acute and chronic undernutrition combined. Globally, an estimated 101 million children under five years of age, or 16%, were underweight in 2011, a 36% decrease from an estimated 159 million in 1990. Underweight has decreased since 1990 while overall progress is insufficient, and millions of children remain at risk.

The prevalence of underweight among children worldwide was 14% in 2016 (WHO, 2017 trends). In Africa, the prevalence was 15.7% while in Asia it was 17.1%. West Africa remains the most affected by underweight with 19.1% against 11% for Southern Africa, 17.3% for Eastern Africa and 5.4% for Northern Africa (UNICEF, WHO, World Bank Group, 2017). Differences between countries' prevalence gives insight to the economic situation of the country. A study in Northern Ethiopia by Alemayehu (2015) found a prevalence of 45.3% underweight. Another study in another region of the country reported a prevalence of 30.9% (Mengistu et al., 2013). Furthermore, in the eastern region of Africa, a cross-sectional study among children in the Kilimanjaro Region, Tanzania showed that the prevalence of children classified as underweight was 46% (Mgongo et al., 2017). Benin had an underweight prevalence of 18% among children in 2014 (UNICEF, WHO, World Bank Group, 2017), while South Africa had 5.9% in 2016 (SA DHS, 2017). In Ghana, 17.6% of underweight has been reported among children under the age of five years in the northern regions (Glover-Amengor, 2016).

2.4.2 Wasting

Acute malnutrition or "wasting" is defined as low weight for height or the presence of oedema. It can be moderate or severe. It is defined as the percentage of children aged 0 to 59 months who are below minus two or three standard deviations from median weight-for-height of the World Health Organisation (WHO) Child Growth Standards (WHO, 2006). This condition occurs because of recent rapid weight loss, malnutrition, or a failure to gain weight within a relatively short period of time. Wasting occurs more commonly in infants and younger children and is a result of deficiencies in both macronutrients (fat, carbohydrate and protein) and some micronutrients (vitamins and minerals). Recovery from wasting is relatively rapid once optimal feeding, health and care are restored, though it may leave permanent debilitating impacts such as cognitive impairment. From the Joint Malnutrition Estimates available for 2017, the severe form is the most dangerous and affects 16.9 million children in the world in 2016 (UNICEF, WHO, World Bank Group, 2015). In 2015, wasting still threatened the lives of 50 million children across the globe

and the global wasting rate was 7.5%. In Asia and Oceania, wasting exposes one in ten children under the age of five years to the risk of death (UNICEF, WHO, World Bank Group, 2015). Whereas the prevalence of wasting on average in Africa at 7.4%, with 8.5% reported in West Africa, the highest in the sub-Saharan Africa region. South Asia is reported to have the highest prevalence of wasting, with 15.4%, requiring urgent intervention according to UNICEF, WHO and World Bank Group (2017). Several intervention programmes are in place for the management of cases detected in the countries most affected. Often the delay in screening or poor follow-up of recommendations by child's family exposes the child to relapse or even death.

2.4.3 Stunting

Although wasting is a serious problem, the biggest challenge for Africa is stunting. This indicator of nutritional status reflects inadequate nutrition over a long period of time. Stunting – moderate and severe, is the percentage of children aged 0 to 59 months who are below minus two standard deviations from median height-for-age of the WHO Child Growth Standards (WHO, 2006). It reflects the chronic deprivation due to inadequate food intake, poor health and poverty resulting, in poor child growth potential. Stunting of children under five years of age is a strong indicator of hunger and endemic poverty. Global and country level stunting prevalence is often far more severe than undernutrition and wasting, and more accurately reflects nutritional deficiencies and sickness that occur during times of growth for a child. Moderate and severely stunted children (whose height-for-age ratios are two and three standard deviations below the international standard) have retarded physical and cognitive growth and suffer from negative implications for child development, school and work performance.

The prevalence of stunting among children in the world is 22.9% (UNICEF, WHO, World Bank Group, 2017). The prevalence is still high, but shows the progress made over the last 10 years as per 2016 the Global Nutrition Report (IFPRI, 2016). At global level, from 29.5% in 2005, stunting dropped to 26.3% in 2010 and 23.4% in 2013. In Sub-Saharan Africa and South Asia respectively, it dropped from 37.5% in 2010 to 34.1% in 2016 and from 41.5% in 2010 to 35.8% in 2016 (IFPRI, 2016; UNICEF, WHO, World Bank Group, 2017). These two regions have prevalence above 30% which is high, and a public health concern. According to Joint Malnutrition Estimates (2017), West Africa had a prevalence of 31.4% with 34% for Benin in 2014 (UNICEF, WHO, World Bank Group, 2017), in South Africa, it was 27.4% (DHS SA, 2017).

2.4.4 Overweight and obesity in children

For children, the definition of overweight and obesity considers age. Overweight is weight-for-height greater than two standard deviations above WHO Child Growth Standards median; and obesity is weight-for-height greater than three standard deviations above the WHO Child Growth Standards median (WHO, 2006). Obesity in children is a genuine problem and a real challenge to face while hunger and undernutrition continue to require more attention. Obesity is a global problem that affects low-and middle-income countries. Childhood obesity is related to a high chance of having chronic diseases and disability in adulthood. Obesity has negative physical, psychological, social, and health consequences in children. It can affect the quality of life experienced by a child and lead to a reduction of life expectancy (Sahoo et al., 2015). Obesity is a complex mix of many factors such as habits, lifestyle, genetic influences (Llewellyn et al., 2013), and environmental factors (MedlinePlus, 2016). Early exposure to under- or over-nutrition, too rapid growth, and early pubertal development are also factors contributing to obesity. Preventing obesity early in the child's life is therefore essential to avoid cumulative weight in adulthood which is more difficult to overcome with all its consequences (Pandita et al., 2016).

Child overweight is also related to growing up in an obesogenic environment, in which population changes in physical activity and diet are the main drivers. Modifiable risk factors for childhood obesity are maternal gestational diabetes, high levels of television viewing, low levels of physical activity, parents' inactivity, and high consumption of dietary fat, carbohydrate, and sweetened drinks (Han, 2010). Optimum growth in the first 1000 days of life is also essential for prevention of overweight. Whereas attained weight at any age in early life is positively associated with adult body-mass index (Kuzawa, 2012; Adair et al., 2013). Rapid weight gains in the first 1000 days are strongly associated with adult lean mass, whereas weight gains later in childhood lead mainly to adult fat mass (Adair et al., 2013).

Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood (Norris et al., 2011; Antonisamy et al., 2016). About 39% of the world's adult population aged 18 years and older were overweight in 2014, and 13% were obese (WHO, 2016). Obesity is no longer the problem of industrialised countries, it is present in sub-Saharan Africa with an increasing trend. About 22.6% overweight in women aged 15 to 49 years was reported by AGVSAN in 2009. In addition to increased future risks, obese children experience breathing

difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance, and psychological effects (Pandita et al., 2016). The global prevalence of obesity in children under five years was 6% in 2016 according to WHO data (JME, 2017). The phenomenon is accelerating in all countries and even in Africa, a rate of 5.2% has been recorded. In Southern Africa, the rate is higher at 11.8% of children being overweight, while West Africa remains with a lower rate of 3%. In her study Kimani-Murage study in a rural South African area noted that the high prevalence of overweight among adolescent girls could account for the high percentage among South African adult women (Kimani-Murage, 2010). In one of its publications, the Lancet Journal presented a systematic study of overweight and obesity between 1980 and 2013 at global level. The numerous studies that have been considered have shown that obesity and overweight have increased during all these years with variations across countries, regions and economic levels. The authors concluded that it is necessary to effectively reduce this epidemic that is taking place all over the world (Ng et al., 2014).

2.4.5 Underweight and overweight in women

Underweight for women of reproductive age is defined as Body Mass Index (BMI) below 18.5 kg/m². BMI is a simple index of weight-for-height that is commonly used to classify adult's nutritional status. It is calculated as a person's weight in kilograms divided by the square of his/her height in meters (kg/m^2). BMI provides the most useful indicator of nutritional status and it is the same for both sexes and for all ages of adults.

Studies show association of underweight with reduced fertility and adverse pregnancy complications including low birthweight, preterm birth, small for gestational age, and neonatal death (Razak, 2013; Han, 2013). Despite a continuous decline in underweight in most sub-Saharan countries, it remains a major concern for women of reproductive age in low- and middle-income countries (LMICs)—for example, affecting more than 15% of women in Asia and Africa (Black, 2013). Prevalence of low BMI (< 18.5 kg/m²) in adult women has decreased in Africa and Asia since 1980 but remains higher than 10% in these two large developing regions. From the result of the 2011 Uganda Demographic and Health Survey, underweight among women was 8% (Turi, 2013) while in adults aged 25 to 64 years old, it was 6.5% in Malawi (Msyamboza, 2013). In Benin, there is an underweight prevalence of 8.4% among women and 10.3% among men compared to the global level mean of 9% and 8.1% for women and men, respectively (NCD Risk, 2017).

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. For adults, WHO defines overweight and obesity as follows: overweight is a BMI greater than or equal to 25, and obesity is a BMI greater than or equal to 30.

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Globally, there has been: an increased intake of energy-dense foods that are high in fat, and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization.

Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with the development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing, and education. Raised BMI is a major risk factor for non-communicable diseases such as:

- cardiovascular diseases (mainly heart disease and stroke), which were the leading cause of death (WHO, 2017),
- out of the 17 million premature deaths (under the age of 70) due to non-communicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by cardiovascular diseases (WHO, 2017),
- diabetes (Simmonds et al., 2015),
- some cancers (including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon) (Simmonds et al., 2015).

Approximately 39% of the world's adult population aged 18 years and older were overweight in 2014, and 13% were obese (WHO, 2016). Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. Obesity is no more the problem of industrialised countries, it is present in sub-Saharan Africa with an increasing trend. It is considered as a serious risk factor for chronic diseases (type 2 diabetes, cardiovascular diseases, and certain cancers) (Adeboye et al., 2012; Tesfai, 2016). Similarly, overweight or obesity is considered a sign of beauty, wealth, and good health by certain beliefs in Africa. Obesity leads to productivity losses due to absenteeism and presenteeism (indirect costs), which represent between US $ 668 and US $ 4,299 per person/year in the United States (Finkelstein et al., 2010). In China,

obesity led to a decline of 3.58% of *Gross Domestic Product* (GDP) in 2000 and a predicted decrease of 8.73% in 2025 (Popkin et al., 2006). Obesity costs between US $ 475 and US $ 2,532 per person/year in the United States (Finkelstein et al., 2010). Obesity is estimated to cost £ 648,000,000 a year in the United Kingdom in 2020 (Wang et al., 2011).

2.5 Double burden of malnutrition

The double burden of malnutrition (DBM) concept first appeared in 1992 at the International Conference on Nutrition (ICN) held by the Food and Agriculture Organization of the United Nations (FAO) and the WHO. The DBM was presented as a "concept" recognising that separating the treatment and/or prevention of nutritional deficiencies and excesses was no longer sensible, given that most countries were dealing with both problems simultaneously (WFP, 2017).

The consequences of the DBM are enormous; early life undernutrition is an underlying cause associated with about a third of young child deaths. The causes of the DBM are related to a series of changes occurring in the world called the nutrition transition, the demographic transition, and the epidemiological transition of countries (Shimpton & Rokx, 2012). The variables associated with the nutrition transition and obesity epidemic can be grouped into four cross-cutting themes, which include: The Health/Biological Environment, the Economic/Food Environment, the Physical/Built environment, and the Socio/Cultural Environment (Shrimpton & Rokx, 2012).

An individual's nutritional status can be affected by circumstances within the household and the community as well. Malnutrition manifests itself at the individual level, but its root and fundamental causes extend to the family, community, national and international levels.

The intermediate causes include household food insecurity through poor agricultural production and income, inadequate care for children and women, unhealthy household environment and lack of accessible health and education services (Black et al., 2013). Underlying these causes are longer-term, more complicated determinants such as poverty as a major factor, along with gender inequalities, and greater political, economic, social and cultural environments which affects institutions and leadership from the community to national level (Fanzo, 2012).

Furthermore, longer breast-feeding duration (more than 2 years), multiple births, experience of diarrhoeal episodes, small size at birth, absence of adequate sanitation facilities in households, poor households, and mothers who are not covered by national health insurance are associated with increased risk of malnutrition (Aheto et al., 2015). High level of education of mother and improved body mass index are associated with decreased malnutrition, while strong residual household-level variations in childhood nutritional outcomes have been reported (Aheto et al., 2015). This means that childhood nutritional outcomes are variable even in mothers who are literate.

It is common to find problems of underweight, stunting, and micronutrient deficiencies side by side with increasing rates of obesity. This “dual burden” of undernutrition and obesity exists not only in countries and communities but in households (Asnawi, 2015) and even in individuals, who may have excess adiposity along with micronutrient deficiencies, such as iron deficiency (anaemia) (Zeba, 2012) or stunting and overweight (Daboné, 2011). Households with double burden of malnutrition are common in countries undergoing the nutrition transition (Popkin, 2012) and may reflect gender or generational differences in food allocation related to social norms. For example, high-quality foods may be given preferentially to adult males rather than to children, which is a cultural norm in some societies.

Many low- and middle-income countries are experiencing a "double burden" of disease. While these countries continue to deal with the problems of infectious diseases and undernutrition, they are also experiencing a rapid upsurge in non-communicable disease risk factors such as obesity and overweight, particularly in urban settings. WHO (2017) states that it is not uncommon to find undernutrition and obesity co-existing within the same country, the same community or within the same household. The study done by Wong et al., (2015) in Orang Asli, Guatemala’s community showed association between maternal short stature and overweight in mother-stunted child pairs. Another study in western Saharan refugees demonstrated that even in this vulnerable group, a high prevalence of double burden of malnutrition (24.7%) was observed (Grijalva-Eternod et al., 2012).

A transitional situation or the coexistence of two types of nutritional problems in the same country poses complex public health problems. These countries need to consider appropriate measures, such as agriculture and public health interventions, to mitigate the effects. An important fact is the rising number of both stunted and overweight children in West and Central Africa, where health-

care systems are ill-equipped to manage this double, and growing, burden of malnutrition. Wojcicki (2014) with her review, also showed the double burden existence in sub-Saharan Africa households.

Undernutrition induced a drop of 1.9% in GDP in Egypt, 16.5% in Ethiopia, 3.1% in Swaziland and 5.6% in Uganda (AUC and NEPAD, 2014). Asia and Africa lose 11% of their GDP annually due to poor nutrition (Horton & Steckel, 2013). Thus, double burden of malnutrition requires action.

2.6 Children care practices

Care and feeding practices are key determinants of children's nutritional status. These are discussed under subheadings.

2.6.1 Breastfeeding and complementary feeding

At birth, the infant should be breastfed within one hour of birth and exclusively breastfed during the first six months of life. That is what WHO recommend in the Global Strategy for Infant and Young Child Feeding by WHO and UNICEF in 2003.

Exclusive breastfeeding is defined as the practice of only giving an infant breast-milk for the first six months of life (no other food or water) and has the single largest potential impact on child mortality of any preventive intervention (Jones et al., 2003). It is part of optimal breastfeeding practices, which also include initiation within one hour of life and continued breastfeeding for up to two years of age or beyond. Early initiation and exclusive breastfeeding for six months provides protection against gastrointestinal infections, which can lead to severe nutrient depletion and therefore stunting (Kramer & Kakuma, 2012).

Breast milk provides essential, irreplaceable nutrition for a child's growth and development. It serves as a child's immunisation, providing protection from respiratory infections (Horta & Victora, 2013*),* diarrhoeal diseases, and other potentially life-threatening ailments (WHO, 2013; Sankar et al., 2015, Ogbo, 2017). Exclusive breastfeeding has a protective effect against obesity and certain non-communicable diseases later in life (Horta & Victora, 2013*)*. Globally 40% of

infants between 0 to 6 months old are exclusively breastfed (WHO, 2017). Over 800 000 children's lives could be saved every year among children under five years if all children 0 to 23 months were optimally breastfed. Breastfeeding improves Intelligence Quotient (IQ), school attendance, and is associated with higher income in adult life (Horta & Victora, 2013). According to the Demographic and Health Survey (DHS) in Benin, 94% of children under two years of age were breastfed but only 33% were breastfed exclusively until six months (DHS, 2012).

Breastfeeding remains the preferred mode of infant feeding in almost all difficult situations, for instance: low-birth-weight or premature infants, mothers living with HIV in settings where mortality due to diarrhoea, pneumonia and malnutrition remain prevalent, adolescent mothers, infants and young children who are malnourished, and families suffering the consequences of complex emergencies (WHO, 2010). The practice of exclusive breastfeeding and early breastfeeding do not seem to be limited by mothers' knowledge but by socio-cultural representations in certain societies. In Senegal, 42% of children received water before six months (Diagne-Guèye, 2010). In South Africa, Seonandan (2016) showed in his review on infant and young child feeding practices in a hospital and some homes in KwaZulu-Natal Midlands that 76% of infants were ever exclusively breastfed with just 36% being exclusively breastfed beyond three months. There is a void between recommendations and practices. Many children receive other fluid than breast milk even before one month. One study in Western Cape showed that 90% of the mothers had introduced water and 83% of them did it before the age of one month (Goosen et al., 2014).

From six months, nutritional needs of the child increases, adequate and nutrient-rich foods can be given while continuing breastfeeding until the age of two years or more. Breast milk can provide half or more of a child's energy needs between the ages of six and 12 months, and one third of energy needs between 12 and 24 months. The transition from exclusive breastfeeding to family foods, referred to as complementary feeding, typically covers the period from six to 24 months of age, and is a very vulnerable period. It is the time when malnutrition starts for many infants, contributing significantly to the high prevalence of malnutrition in children under five years of age world-wide. Studies have reported that dietary diversity (Onyango, 2013**)** and the consumption of foods from animal sources are associated with improved linear growth (Dror & Allen, 2011). Complementary feeding should be *timely*, meaning that all infants should start receiving foods in addition to breast milk from six months onwards. It should be adequate, meaning that the complementary foods should be given in amounts, frequency, and quality using a variety of foods

to cover the nutritional needs of the growing child while maintaining breastfeeding (SA Department of Health, 2013). After the age of two years, the child's diet must remain diversified to ensure linear growth. Children are often on a family meal, as per some studies done on the food basket. A South African study has recorded several dietary deficits and a rising trend in the consumption of inappropriate nutritionally poor food (Budree et al., 2016). Shrish Budree (2016) indicated a high daily consumption of processed meat (56%) and inappropriate foods such as fruit juice (82%), soft drinks (54%), and refined sugary foods (51%) at one year of age. In another study done in Benin, Mitchodigni et al., (2017) recorded cereal porridges which were unenriched as complementary foods given to children over six months and low consumption of fruits and eggs.

2.6.2 Water, Hygiene and Sanitation (WASH)

Mothers and children's health also depends on the conditions of the environment they live in. Drinking water, availability and its mode of supply, and the presence of adequate sanitation are indicators of the economic level of the household. WHO estimates that 50% of undernutrition is associated with infections caused by unsafe drinking water, inadequate sanitation or insufficient hygiene (WHO, 2008). Numerous studies have shown how water, hygiene and sanitation influence maternal and child status. In rural India, improved conditions of sanitation and hygiene practices are associated with reduced prevalence of stunting (Rah et al., 2015). Unsafe water, poor sanitation and hygiene are directly linked to undernutrition in children through three key pathways: diarrhoea, intestinal worms (soil-transmitted helminths), and Environmental Enteric Dysfunction (EED) (Cumming et al., 2015). Some observational studies have shown a strong association between WASH and childhood undernutrition (Spears, 2013; Spears et al., 2013; Rah et al., 201; Liu et al., 2015). An analysis of 2010 Rwanda Demographic Health Survey identified lack of access to drinkable water as a risk factor for undernutrition in children under five (Mukabutera et al., 2016). Similarly, an analysis in the Lancet in 2013 shows that a quarter of cases of stunting can be attributed to the occurrence of five or more episodes of diarrhoea before two years of age (Walker et al., 2013). Two randomised controlled trials on WASH and undernutrition have been published in the Cochrane review. Their findings showed a significant effect of WASH factors on childhood stunting (Hammer & Spears, 2013; Pickering et al., 2015).

A recent systematic review of 14 studies on WASH interventions in ten low and middle-income countries, found suggestive evidence that WASH interventions positively affect height-for-age scores in children under five years of age (Dangour et al., 2013). Much progress has been made in

attainment of safe drinking water and good sanitation. According to the United Nations Children's Fund (UNICEF) and the World Health Organisation (WHO) progress report on Sanitation and Drinking Water in 2015, global coverage of the use of improved drinking water sources and sanitation facilities rose respectively from 76% to 91% and 54% to 68% during the Millennium Development Goals period (MDGs 2000-2015). Despite significant progress in water and sanitation, much remains to be done particularly in sub-Saharan Africa. In 2015, 663 million people still lacked improved drinking water sources with 319 million in sub Saharan Africa (SSA) and 2.4 billion people still lacked improved sanitation facilities with 695 million in SSA (WHO and UNICEF, 2015).

2.7 Foods taboos and cultural practices

Taboos are technically defined as a practice "proscribed by society as improper or unacceptable." Encyclopaedia of Food and Culture (2003) define food taboo as a prohibition against consuming certain foods. The word "taboo" (also spelled "tabu") is Polynesian and means 'sacred' or 'forbidden'; it has a quasi-magical or religious overtone. In the field of food and nutrition, food taboos are not necessarily connected with magical-religious practices. In certain cultures, there are some temporary food taboos during critical life stages like pregnancy, birth, lactation and infancy.

Different forms of taboos and cultural beliefs about food exist. They vary from one society to another. For example, snails and cane rat meat are taboo among pregnant women and eggs among children in South Eastern Nigeria (Ekwochi et al., 2016). Similarly, in rural Ethiopia, pregnant women avoid eating green leafy vegetables, yogurt, cheese, sugar cane, and green pepper as habitual in fear of obstetric complications associated with the delivery of a bigger infant (Zerfu et al., 2016). Mbithe et al., (2012) has reported in her study on School-Going Children in Machakos District, Kenya that cultural beliefs, taboos and attitudes negatively affect food consumption. In another study in Gambia, it has been proven that taboos, customs, and beliefs contribute to malnutrition among the Fula in different ways (Pérez et al., 2013). A study in Kenya observed that food taboos are delaying progress in fighting undernutrition because of cultural beliefs (Abubakar, 2011). These beliefs are thought to limit intake of essential nutrients. Furthermore, a study conducted in Papua New Guinea have shown that many foods rich sources of protein have been enlisted as taboos for pregnant women. It is believed that because protein helps the body to grow, if a woman consumes a lot of protein in her pregnancy, then the baby will grow too big leading to complications during the labour (Kuzma, 2013). It is now believed that some of the food taboos on restrictions on what women could eat, is rooted in the patriarchal philosophy of the past.

2.8 Summary of the literature

Malnutrition is a public health problem that developing countries are facing and Benin is not spared. Malnutrition in children is globally the most important factor for illness and death. Benin had a 4.5% wasting rate and a high prevalence of stunting of 34% in 2014 (UNICEF, WHO, World Bank Group, 2017). According to the World Health Organization, undernutrition is the single largest risk factor contributing to the global burden of disease in the developing world. It has an economic cost. Studies on malnutrition risk factors have been conducted and brought to light. Undernutrition among children under five years is linked with various factors such as economic status, mother's education level, sanitation and hygiene, maternal nutritional status and feeding practices.

Another aspect of malnutrition is obesity among children. Childhood obesity is linked with a high chance to develop chronic diseases and disability in adulthood. In 2012, DHS reported a prevalence of 26.9% overweight in Benin. The presence of both forms of malnutrition denotes a nutritional transition underway in Benin and points to the -need to design interventions to reduce under-nutrition but also prevent the epidemic of obesity that seems to loom on the horizon. The presence of undernutrition in children and overweight or obesity of the mother is the double nutritional burden with consequences which are enormous. The causes of the DBM are related to a series of changes occurring in the world called the nutrition transition, the demographic transition, and the epidemiological transition of countries. Wojcicki (2014) in her review, showed the double burden existence in sub-Saharan Africa households. DBM requires reconsideration of the types of nutritional interventions to reduce both aspects of malnutrition at the same time and an investigation of food distribution within households.

CHAPTER 3: METHODS

3.1 Introduction

In this chapter, the methods of data collection are discussed under various sections.

3.2 Research design, location, and population

3.2.1 Study design

The study is a mixed method, cross-sectional, descriptive and analytical study. A descriptive study involves acquiring information about one or more groups of people by surveying a sample of the population at large. It captures a fleeting moment in time. From one transitory collection of data, conclusions could be drawn, and it may be generalised for a longer time (Leedy & Ormrod, 2013). The study is descriptive where the prevalence of stunting, wasting, overweight among children, and overweight or obesity among their mothers is assessed. A descriptive cross-sectional approach is used to assess the burden of a specific disease in a defined population. An analytical study examines the extent to which differences in one variable are related to differences in one or more variables (Leedy & Ormrod, 2013). In the analytical part of this study, results were used to investigate the association between socio-cultural practices, anthropometric measurements, and dietary patterns. The study uses both quantitative and qualitative techniques for data collection.

3.2.2 Study location

The study took place in peri-urban and rural areas of Grand-Popo in Benin, a country in West Africa. The Community of Grand-Popo is in the Southwest of the Mono Department. The Mono Department is one of 12 in Benin and located in the South West. It is bounded to the north by the Communities of Athiemé, Comé and Houéyogbé, to the South by the Atlantic Ocean, to the South-West by the Communes of Ouidah and Kpomassè, and to the West by the Republic of Togo. Located in south of Benin, Grand-Popo is a town of 289 km². It has seven (07) districts and 60 villages (Notebooks of neighbourhoods and villages, 2013) with a population of 57,636. It is located 85 km from Cotonou, the economic capital of Benin (Figure 3.1).

Adapted from: INSAE, 2004

Figure 3.1: Location of the study area

3.2.3 Study population

The population of the community is estimated at 57, 636 inhabitants, 28, 237 men and 29, 399 women, according to the national demography in 2013 (RGPH4, 2015). About 8, 476 children have been enumerated in the 2013 national demography census. Adja ethnic groups represent 70% of the population of the municipality of Grand-Popo. They are mainly Xwla (or Popo) in the west and in the lagoon areas, Xuela (or Pedah) in the northeast, and Guen (or Mina) on the coast (Capo-Chichi., 2006). Fishing is a major activity, followed by agriculture (products of market gardening and food crops). Resources from all local production are insufficient for the population and they import from neighbouring municipalities and Togo's cities. Grand-Popo has a high prevalence of children's chronic malnutrition 39.4%, and prevalence of overweight or obesity was 1.8% in children (INSAE, 2012). Among adult women, in 2009 the Global Analysis of the Vulnerability, Food Security and Nutrition report (AGVSAN) estimated the prevalence of overweight or obesity at 20.8%. About 11% of the population of Benin is threatened by food insecurities (AGVSAN, 2009). Grand-Popo is in a community where the rate of food insecurity is 28% and is in a department where chronic malnutrition is estimated at 35.9% (AGVSAN, 2009).

3.3 Sampling strategy

3.3.1 Sample size

The sample size is calculated with children's population size of the area which was 8, 476 in 2013. The sample size is estimated at 400 mother-child pairs using the system of the Australian national statistical services (CSC, 2016) with a 95% confidence level and 5% of precision. A random selection of participants was made in each district. An additional 50 mother/child pairs were added to compensate for natural attrition. The desired size for focus group was estimated at 10% or 40 mother-child pairs.

3.3.2 Sample selection

In the community of Grand-Popo, there are 60 villages in seven districts. A simple random choice of the sample villages was made. Selection was made in all districts and three or four villages were chosen randomly in each district, making a total of 24 (which is 40% total villages in the area) villages. This ensured a wider coverage of the districts. Households were then randomly selected from the villages using the criteria. One mother/child pair was chosen by household and by concession. If the mother had another child under five years the youngest one was selected. The village leaders explained the research to the households to make them aware of the study, prior to the selection. Eight to ten mothers were also recruited from only four villages for focus group discussion.

Inclusion criteria

To participate in this study:

- Children were between 0 and 60 months,

- Parents living in the area for at least 6 months.

- All ethnic groups were included

Exclusion criteria

Those who could not participate in the study:

- households without children,

- households with caregivers (not mothers).

3.4 Variables measured

The constructs listed below were measured in this study to provide data to address the objectives.

Quantitative data:

1. Socioeconomic and household parameters
2. Anthropometric measurements
3. Feeding practices

Qualitative data

4. Sociocultural practices

To carry out the survey, research instruments (questionnaires, food frequency questionnaires, group discussion guide, anthropometric equipment) were used to ensure the quality of the data collection. General information about the household (code of household, age of the mother, and age of the child) was collected. The questionnaire included various components described in the following sections. Demographic and socio-economic factors (Appendix 1, Section C), assessment of dietary patterns (Appendix 1, Section D and Appendix 3), breastfeeding and complementary feeding practices (Appendix 1, Section E), anthropometric measurements (Appendix 1, Section B) and focus group discussion guide on socio-cultural practices (Appendix 5). The questionnaire was translated to French by researcher (see Appendices 2, 4, 6). The questionnaire was designed using literature, and guided by similar previous studies done in Wallonia region (Belgium), rural west Java and Oujda-Angad in Morocco (Sauvageot et al., 2013; Sekiyama et al., 2015; Sellam & Bour, 2015).

3.4.1 Demographic and socio-economic characteristics

This questionnaire (Appendix 1, Section C) included questions concerning:

- Household characteristics (ethnicity, household size, number of children, and household income),
- Maternal information (age, marital status, education, occupation, income),
- Child profile (sex, age), Children's dates of birth were recorded from health cards and when it was not available, the age recorded was mostly based on the mother’s memory.
- Material possessions (and other comfort indices) of households were asked to assess their economic level (radio possession, TV, refrigerator, car, motorcycle, etc.),

- Services (electricity, running water), materials construction of the house (roof, walls, floor), source(s) of income(s), household status in the occupied housing (owner, tenant), cooking food energy sources (electricity, gas, coal),
- Source of drinking water (tap, bottled water, public fountain).

These were measured to determine the socio-economic status of the household including purchasing electricity.

3.4.2 Assessment of dietary patterns

A questionnaire concerning eating habits (Appendix 1, Section D and Appendix 3) was administrated to the participants to determine feeding practices of children and mothers.

This was done in two parts:

- Questions about usual eating habits: drinking and smoking, frequency of meals cooking and eating, outside eating frequency, food intolerance (Appendix 1, Section D),
- Food Frequency Questionnaire (FFQ) (Appendix 3): a good tool to estimate food consumption, nutrient intakes and assess usual intakes. In this study, the FFQ was used to estimate the frequency and consumption of food items only. Nutrient intakes were not a subject of this study. Questions about the frequency of consumption of major food groups are asked. A finite list of foods and beverages was created to indicate usual frequency of consumption over the period queried (Jackson et al., 2011). A list of food consumed was made for mother and child separately.
- These were determined to estimate dietary patterns of children and mothers including food distribution within the household. The frequency was estimated as food consumed on a regular basis (4 – 7 times per week) or weekly (3 or less per week). Mothers were asked to indicate whether they gave the child the food, and to indicate whether this was regular or weekly. The interviewer then recorded on the questionnaire. The same procedure was used for the mothers, where they were asked whether they consumed the food item and how often. Food items were identified by name only and mainly using local language.

3.4.3 Breastfeeding and complementary feeding

This part of the questionnaire (Appendix 1, Section E) elicited information on breastfeeding and care practices. The questions addressed: exclusively breastfed (< 6 months), first time breastfed,

breastfeeding duration, age of introduction of complementary food, and the five first foods introduced. This was done to determine the feeding practices of children from birth.

3.4.4 Anthropometric measurements

Anthropometric measurements of the mother and the child were taken and recorded (Appendix 1, Section B). Age, height or length (depending on the age of the child), and weight of the children were recorded. Height (or recumbent length for children aged < 2 year) was measured to the nearest 0.1 cm using a wooden mobile stadiometer. This model measures the child in a lying or standing position. Children were weighed without clothes, and those unable to stand up were weighed with the mother. The equipment used was a Seca 874 scale. This scale can measure up to 150kg with a precision of 0.1 kg (100g) with mother-child function. First the mother was weighed. After the weight was recorded, the mother remained standing on the scale, the scale was then zeroed, by pressing the tare button and when the zero appeared, the child was given to the mother and the weight of the child appeared in the display. The weight was recorded to the nearest 100g.

Mothers gave their age in years. Height, weight and waist circumference were measured with standard methods for adults using calibrated instruments (Gibson, 2005; Paediatrics, 2009). For mothers, the following method was used: height was measured in centimetres to the nearest 0.001m by using a calibrated stadiometer. Participants were asked to remove their shoes, heavy clothes and all hair bands and other objects that could distort the measurement. Height measurements were done twice and the average of the two measurements was used for statistical analysis. Weight was recorded using the same scale previously used for the children. The participants were asked to remove all jackets and coats as well as their shoes. Measurements were recorded to the nearest of 0.1kg. The weight measurement was done twice for mother as well as for children, to improve reliability, and the average of the two measurements was used.

A high waist circumference is an abnormal indicator that has been associated with an increased risk for chronic diseases. Waist circumference was measured by using a strong non-flexible measuring tape. The measurement was taken at the level of the iliac crest at the point between the highest point of the hip bone on the right side and the lowest rib. The measuring tape was in a horizontal position and the measurement was taken at normal expiration. The investigator repeated the measurement twice to the nearest 0.1 cm and the average was calculated.

3.4.5 Socio-cultural practices

Four focus groups were conducted to establish the socio-cultural practices that influence children's diets. Focus group discussion is a research methodology in which small group of participants discuss about specific topic. Focus group helped to provide information about individual's feelings, community practices and beliefs. The investigator welcomed the participants and asked each of them to introduce themselves. The investigator summarised the purpose of the discussion and informed the members that participation was voluntary, and that the discussions were recorded. Confidentiality was assured to them. The investigator facilitated the focus group using the discussion guide (Appendix 5). This guide was developed with questions on specific topics to help managing the discussion. Literature (Medhin et al., 2010; Demissie 2013; Kuzma et al., 2013) as well as intended objectives were used to generate the sociocultural practices questions. Themes about children care practices, eating habits, and food taboos were discussed with each group. The investigator allowed the participants to express themselves freely. Assistants were observers during discussion, recorded and took notes.

3.5 Data collection procedures

Data was collected by the principal investigator from the 1st February to the 10th April 2017. Two students from the Department of Nutrition of Benin's University were selected to help the investigator with information recording and anthropometric measurement. A training day was scheduled for the two students about the questionnaire and how to complete it. The questionnaire was completed in full to enable them to become familiar with the format of the questionnaire. The techniques of anthropometric measurements were also carried out to ensure their assistance in the field during the surveys. The consent form which each participant was to sign was also explained to them.

During the first visit, the investigator and assistants were introduced to the chief of the village, where they explained the purpose of study and sought permission. The Chief of the village helped the team to inform the community of the study and also eased their entry to contact and recruit households. After recruitment of the household, the consent process was explained after which the consent form was presented to the mothers for signing. Those who could not make a signature had their fingerprints pasted using ink.

Participants were also informed that participation in the study was voluntary and those who did not want to take part were free to decline. The investigator took the measurements while the assistants were recording. The assistants also helped to get participants consent. The questionnaires and consent form used were in French. The investigator and the assistants were fluent in the languages used. Interviews were then held with the participants in their household in a local language (Mina) using the French questionnaire and the team recorded the answers on the French questionnaires. The questionnaires were later shipped to Stellenbosch University once data collection was completed.

Focus groups were held in four villages (Ayi guinnou, Kpovidji, Conho, Cotocoly). The discussion groups comprised of seven to eight participants gathered in the public square or under the tree. The participants were recruited during the quantitative data collection. Dates and venue were arranged for the meetings. Participants gave their oral consent before discussion started. The investigator led the discussions which were recorded, while the assistant took notes.

3.6 Data quality control

Quality control of collected data was done every day by the investigator to correct mistakes and make notes on missing information. The assistants had been trained by the investigator in the presence of the co-supervisor in Benin. Same constructs were collected by the same person. In addition, the assistants were recruited from university nutrition students where the co-supervisor worked. Thus, a certain level of skills and competencies in nutritional assessment were already in place. Oversight during data collection in Benin, was provided by Dr Azandjeme Colette the co-supervisor. The anthropometric equipment was also loaned from her department (Institut Régional de Santé Publique, Université d' Abomey-Calavi, Benin). Double data entry was done by the investigator and one trained data entry clerk to assure top quality data entry. Furthermore, data was checked by the main supervisor, and cleaned, prior to analysis.

3.7 Validity and reliability

Validity and reliability of the data collection instruments were assured by the researcher through choosing instruments that have been validated in numerous studies (Cunha et al., 2010; Stanton, 2011; Glover-Amengor et al., 2016). Also, Validity and reliability of the questionnaires were

tested in a pilot study. The anthropometric measuring instruments were calibrated, and its functioning was checked daily before the activities commenced. As previously mentioned, the questionnaire was translated into French. The assistants were trained for questionnaire's administration and were selected because of their background in nutrition data collecting to ensure the quality of the data collected. Thus, the interviews were done in the local language (Mina), since most mothers did not understand French. Triangulation is a method that facilitates validity of data through a variety of sources used to collect data on the same topic. Triangulation was used by combining quantitative and qualitative methods. Triangulation of data from individual interviews and focus group discussions allowed for an overview of reality (food perceptions, cultural beliefs, taboos, care and feeding practices) in the community surveyed.

3.8 Pilot study

To ensure the validity of the questionnaire, a pilot study with ten mothers was conducted to ensure that questions were clear, well formulated, and not ambiguous, relevant to the study population, appropriate to use as a research tool, and in line with the expectations of the study. The results of the pilot study were not integrated with those of the main study. No changes were made in the questionnaire. Some reminders to assistants were made about how to conduct interviews and obtain useful information. The pilot study was thus used as a training platform for the assistants. The results were discussed with the co-supervisor for her inputs.

3.9 Data and statistical analyses

Microsoft Excel was used to capture the quantitative data and IBM SPSS version 25 was used to analyse the data. Anthropometric indices were calculated in z-scores, using WHO Anthro software (version 3.2.2.1 January 2011). Descriptive statistics were used to examine the distribution of variables. Categorical variables were created using cut-offs for appropriate nutritional status for mothers and children. Bivariate analysis was carried out with all factors (socio-economics, food consumption, childcare practices and nutritional status) to determine factors associated with malnutrition in households. A p-value of < 0.05 represents statistical significance in hypothesis testing and 95% confidence intervals were used to describe the estimation of unknown parameters.

Different variables were calculated into z-scores, using WHO Anthro software to classify children's nutritional status: weight-for-age z-score (WAZ), height-for-age z-score (HAZ), and BMI-for-age (BAZ) by using the 2006 WHO population reference (Grijalva-Eternod et al., 2012).

Stunting is defined as a height-for-age z-score < -2 according to WHO growth standards, and overweight for children is defined as weight-for-length/height (WHZ) > 2 standard deviation (Paediatrics, 2009).

Weight-for-Age reflected body mass relative to chronological age. WAZ < -2 is termed underweight-for-age.

Height-for-Age reflected linear growth. HAZ < -2 can be due to shortness (due to a normal variation or a pathological process) or stunting (a failure to reach linear growth potential due to undernutrition).

Weight-for-length/height reflected recent illness or food shortage but also a risk of overweight or obesity when WHZ-score is > 2.

BMI is a ratio also known as the Quetelet's index (height-weight index). BMI classifications were used to assess the weight status of the mothers while BMI for age scores (BAZ) was used to assess obesity in children.

Overweight classification for mothers: BMI is calculated as weight (in kg) divided by body height (in meters) squared. Using BMI cut-off point by WHO, the researchers defined a BMI of < 18.5 kg/m^2 as underweight, 18.5 to 24.9 kg/m2 as normal weight, ≥ 25 kg/m2 as overweight and ≥ 30 kg/m^2 as obesity (Cogill, 2003).

Overweight is defined by BAZ > 2 z-score and obesity is defined by BAZ > 3 z-score. Interpretation was done using the tables below.

Table 3.1: Z-scores classification to determine nutritional status of children (WHO, 2009)

Z-scores classification	WAZ	WHZ	HAZ	BAZ
< -3SD	Severely underweight	Severely wasted	Severely stunted	Severely wasted
-3SD to < -2SD	Underweight	Wasted	Stunted	Wasted
-2SD to < -1SD	Mildly underweight	Mildly wasted	Mildly Stunted	Normal
-1SD to + 1SD	Normal WAZ	Normal WHZ	Normal height	Normal weight
> +1SD to ≤ + 2SD	Possible growth problem	Possible risk of overweight	Normal height	Possible risk of overweight
> +2SD to ≤ + 3SD	Possible growth problem	Overweight	Normal height	Overweight
> +3SD	Possible growth problem	Obese	Above normal	Obese

For establishing whether the observation of nutritional status is of public health importance, the following classification for assessing severity of malnutrition by prevalence range was used.

Table 3.2: Severity of malnutrition by prevalence ranges.

Indicator	Severity of Malnutrition (%)			
	Low	Medium	High	Very High
Stunting	< 20	20-29	30-39	> 40
Underweight	< 10	10-19	20-29	> 10
Wasting	< 5	5-9	10-14	> 15

Adapted from: (http: //www.who.into/nutgrowthdb/into)

For women, Body Mass Index (BMI, kg/m^2) and waist circumference (WC) were used to show their nutritional status and to identify the risk of chronic diseases. Disease risk is defined as WC > 80 cm where the risk of metabolic complications increased, and WC > 88 cm for risk of metabolic complications (WHO, 2000a, and 2000b). At household level, double burden of malnutrition is defined as the coexistence of an overweight or obese mother and an underweight and/or stunted child. The double burden is estimated using regression analysis of these variables. Relationships of variables is determined using Pearson's and Spearman correlations. Chi-square test is used to test for significance at $p < 0.05$.

For focus group data analysing, interviews recorded were transcribed and translated to English. The data collected was classified and organized to themes before generalisations were made. The analysis followed Creswell (2009) data analysis steps listed below:

1. Organising and preparing transcribed and field notes for the data for analysis,

2. Reading through all the data to gain a general sense of the information and reflection on the overall meaning,

3. Generating description of the setting or people and identifying themes from the coding and searching for theme connections,

4. Conducting analysis based on phonemic analysis techniques. This involved coding or organising related segments of data into categories,

5. Data representation, interpretation and comprehending the results and report generation

3.10 Ethical considerations

The study protocol was submitted to the Health Research Ethics Committee of the Faculty of Health Sciences, Stellenbosch University. Ethics approval was obtained under reference No: S16/10/211 (Appendix 8). In addition, the departmental director of Health of Mono-Couffo (Benin) gave authorisation (Appendix 9) to conduct the survey in that region.

The aim of the study, expectations and confidentiality of all information were presented to mothers in the local language (Mina) before they were invited to participate in the study. There was no risk in the study and participants were not paid. Participation was voluntary, and they were free to withdraw at any time if they felt uncomfortable, without prejudice or penalty. For assurance confidentiality to participants, all participants signed a consent form (Appendix 7) for themselves and their children.

Information collected was treated anonymously and with confidentiality. Information sheets were coded and only the principal investigator had access to them. For focus groups conducted, the investigator obtained addition consent, which was given orally, and assured the participants that their personal information will not be disclosed.

Information will be saved for five years or until findings are published. The results will be published but participants' details of the participants will not be disclosed. All questionnaires and consent forms were shipped from Benin and are being stored at the Division of Human Nutrition, Stellenbosch University.

3.11 Challenges encountered

The researcher did not encounter resistance or any major issues during the study. Mothers were ready to help but the length of the questionnaire often exhausted them. Only one mother showed opposition at the beginning of the questionnaire after the question about the type of marriage she contracted was asked. This question seemed offensive to her. The researcher managed the process and the mother was able to continue after being given an option to withdraw.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents findings of the quantitative part of study in accordance with the objectives defined for this research. Tables and charts are used to illustrate the results, n or the sample size is presented in the frequency tables and data is presented in percentiles. Part of this presentation will describe the main parameters observed, such as socio-economic and demographic characteristics of the households, nutritional status, and children feeding care practices. Then correlations between double burden of malnutrition, eating patterns, and socio demographic status are presented. A total of 408 children-mother pairs participated in the study. The results of the qualitative part on children feeding care practices and food taboos is reported in the next chapter 5 (five).

4.2 Socio-economic and demographic characteristics

The mean age of children who participated in the study was 24.45 ± 14.9 months and 46.8% were males, while 53.2% were girls. Approximately 10.4% of children were born with a low weight, among children whose birth weights could be recorded (n =135, see Table 4.1).

Table 4.1: Children characteristics

Children characteristics	**%**	**Mean ± SD**
Child age (n= 408)		24.45 ± 14.9
1-5 months	10	
6-11 months	14.2	
12-23 months	27	
24-35 months	20.1	
36-47 months	16.2	
48-59 months	12.5	
Sex (n= 408)		
Male	46.8	
Female	53.2	
Child birth weight (n=135)		3.029±0.45
Low birth weight < 2.5	10.4	

The mean age of mothers who participated in this study is 27.99 ± 6.99 years (Table 4.2). Most of them are between the ages of 16 and 25 years (45.1%). The majority of mothers (93.1%) are married or living with the partner, with 74.1% living in a monogamous household. Considering mothers' education status, almost half have no education and 36% have just the primary level. As occupation; they are either trader (23.3%), manual workers (44.6%) (gardeners, craftswomen,

fishmongers). Mothers have income from small shops (50%) or depend on the husband (30.1%). Number of children per mother is 2.99 ± 1.78 children.

Table 4.2: Maternal characteristics

Maternal characteristics	**% (n= 408)**	**Mean ± SD**
Mother age		27.99 ± 6.99
16-25 years	45.1	
26-35 years	40.9	
36-45 years	12.5	
46-63 years	1.5	
Marital status		
Single	2.5	
Married/Living with partner	93.1	
Separated	0.7	
Divorced	2.9	
Widowed	0.7	
Type of marriage		
Monogamy	74.1	
Polygamy	25.9	
Level of Education		
None	40.2	
Only alphabetisation	0.7	
Primary school	36	
Secondary school	22.8	
University	0.2	
Maternal occupation		
Housewife	30.1	
Employee	1.2	
Trader	23.3	
Manual worker	44.6	
Student	0.7	
Number of children per mother		2.99 ± 1.78
1 child	26	
2-4 children	51.7	
5 and more children	22.3	
Mother's main source of income		
Salary (permanent employment)	1	
Salary (daily or temporary)	29.7	
Trade (vendor)	50	
Help, assistance	9.1	
Husband	10.3	

Table 4.3 below shows characteristics of households studied. Seven districts were surveyed in two different areas (rural and peri-urban), with 68.9% of households in rural areas. The average household size is 4.88 ± 1.8 persons and in 96.3% of households, the man is the head. Few mothers were head of household and most of them were divorced or widowed. Almost 76.9% of the fathers of the surveyed children are manual workers (fishermen, gardeners, craftsmen, workers) and

68.6% get daily or temporary salary. In most household, it is the man who decides how to spend money on food (77.9%) and sometimes, partners decide together (11.3%).

Table 4.3: Household socio-demographic characteristics

Household characteristics	**% (n= 408)**	**Mean ± SD**
Residence Area		
Peri-urban	31.1	
Rural	68.9	
Household size		4.88 ± 1.8
2-5 persons	68.9	
6-13 persons	31.1	
Head of household		
Man	96.3	
Woman	3.7	
Paternal occupation		
Employee	11.8	
Manual worker	76.9	
Trader	3.7	
Student	2.9	
Traditional doctor	1	
Father's main source of income		
Salary (permanent employment)	8.1	
Salary (daily or temporary)	68.6	
Trade	15.2	
Help, assistance	4.2	
Who decides to spend on food?		
Father/in law	0.7	
Mother/in law	1	
Husband/Partner	77.9	
Yourself	9.1	
Wife and husband	11.3	

Table 4.4 shows the economic characteristics of households. About 91.7% of household has a monthly income of $60 and spends on average $24 ± $11.2 on food. Most of the households live in one room (61.5%) and most of the time it is a family house (68.4%). Houses are built using different materials. They use paraffin oil (70.6%) for lighting and firewood (85.5%) for cooking meals. They get drinking water from manual pump (39.7%) or wells (44.4%). Few of household still used surface water (river or pond or lake; 5.1%). For sanitation, 77% do not have access to toilet facilities.

Table 4.4: Household economic characteristics

Characteristics	% (n= 408)	Mean ± SD
Household income (USD/month)		
60$	91.7	
60-100$	8.1	
More than 100$	0.2	
Expenditure on food (USD/month)		24$ ± 11.25$
9-16$	22.3	
18-34$	58.6	
36-80$	19.1	
Rooms possession		
1 room	61.5	
2 rooms	32.1	
3 rooms and more	6.4	
Status in dwelling house		
Family house	68.4	
Land owner	21.3	
Tenant	8.8	
Material of the house's floor		
Cement	51.7	
Soil, sand, stone	48	
Material of house's wall		
Clay	37.5	
Cement Brick	21.1	
Semi Hard / terracotta	20.3	
Palm branch, cardboard, oilcloth	15.2	
Wood, bamboo	4.9	
Sheet metal	1	
Material of the house's roof		
Straw	56.6	
Tile	25.7	
Sheet metal	16.9	
Slab (concrete)	0.7	
Main source of lighting		
Paraffin Oil	70.6	
Torch	18.4	
Electricity	7.4	
Solar panels	2.2	
Generating set	1.5	
Fuel used for cooking most of the time		
Firewood	85.5	
Charcoal	13.5	
Paraffin Oil	0.7	
Gas	0.2	
Source of water		
Wells	44.4	
Manual pump	39.7	
Tap water	9.6	
Surface water (river, pond, lake)	5.1	
Access to toilets		
No facilities	77	
Pit	20.6	
Modern latrines (Flush)	2.5	

4.3. Food patterns of households

None of the mother's smoke and just a few of them drink alcohol (23.3%). Meals were cooked twice or more per day (84.6%) in many households, and three meals were taken per day in 79.4% of the households. The purchasing of food (82.8%) in the households depended on the husband and was done by 83.6% of households twice a week. About 63.5% of mothers bought food and ate on the street. About 17.2% of households have a small garden and produce African Eggplant leaves (*Solanum macrocarpon L*), carrot, jute leaves (*Corchorus olitorius*), pepper *(chilli*), onion, okra (*Hibiscus esculentus*), and tomato.

4.4 Nutritional status

Prevalence of malnutrition among mothers and children are shown in the tables below, interpreted using WHO reference standards (WHO, 2007).

4.4.1 Children nutritional status

Acute malnutrition indicated by wasting is 9.8%, while chronic malnutrition indicated by stunting is high with a prevalence of 29.7%. Prevalence of overweight and obesity are not very high in children (Figure 4.1 and Figure 4.2).

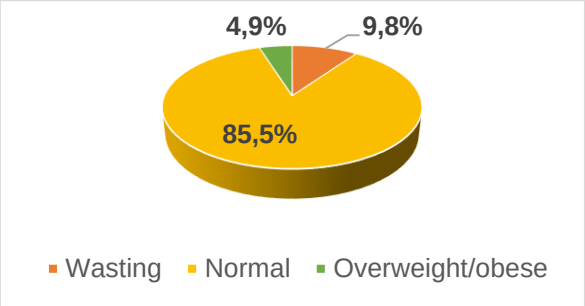

Figure 4.1: Prevalence of wasting among under five years children (n=408)

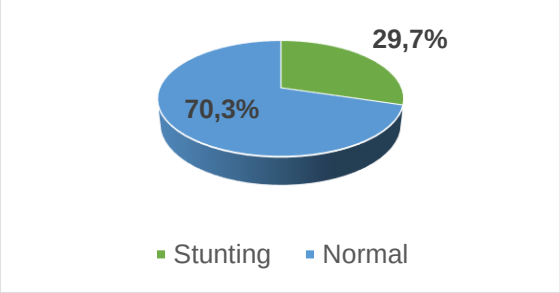

Figure 4.2: Prevalence of stunting among under five years children (n=408)

Stunting and wasting are higher in peri-urban areas but not significant when considering the prevalence by location with a p-values > 0.05 (Table 4.5).

Table 4.5: Nutritional status among under five years children (n= 408**)**

Variables	**Height/length-Age-Z score**		**p-value**	**Weight-Height/length-Z score**			**p-value**
	Stunting z < -2	Normal z ≥-2		Wasting < -2	Normal -2 ≤ z ≤ 2	Overweight/ obese z > 2	
Mean ± SD	-1.17 ± 1.7			-0.49 ± 1.46			
nutritional status (%)	29.7	70.3		9.6	85.5	4.9	
Area			**0.212**				**0.184**
peri-urban	33.9	66.1		13.4	81.1	5.5	
rural	27.8	72.2		7.8	87.5	4.6	
Age			**0.008**				**0.501**
0-5 months	12.2	87.8		12.2	75.6	12.2	
6-11 months	19	81		5.2	91.4	3.4	
12-23 months	39.1	60.9		11.8	83.6	4.5	
24-35 months	35.4	64.6		8.5	85.4	6.1	
36-47 months	25.8	74.2		9.1	87.9	3	
48-59 months	31.4	68.6		9.8	88.2	2	
Mother level of education			**0.915**				**0.480**
None	29.9	70.1		12.2	81.7	6.1	
Only alphabetisation	33.3	66.7		33.3	66.7	0	
Primary school	27.9	72.1		8.2	89.1	2.7	
Secondary school	32.3	67.7		6.5	87.1	6.5	
University	0	0		0	0	0	

Stunting is 29.7% in the district, and high prevalence is noted in the 12 to 23 months and 24 to 35 months, 39.1% and 35.4% respectively. With 0.008 as p-value, results are significant. Stunting is distributed equally by level of education of the mother. Wasting is 9.6% with the highest prevalence in the 0 to 5 months (12.2%) and 12 to 23 months (11.8%) groups but there is not significant (Figure 4.2). Children's overweight / obesity prevalence is not high among the sample studied (4.9%). Stunting is linked to gender and children age group. Stunting is more prevalent among children more than six months and among boys. It is showed with results with p-value < 0.05.

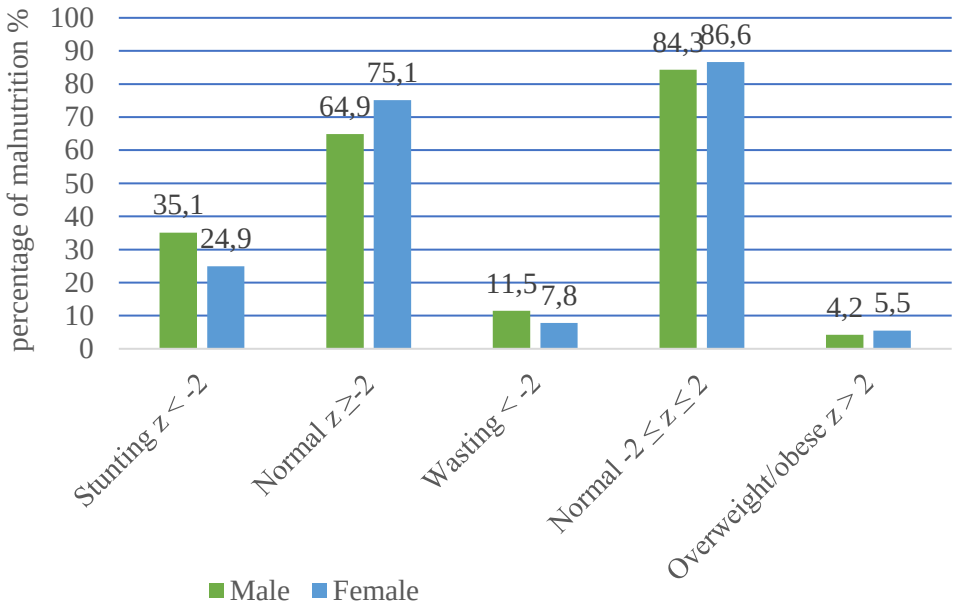

Figure 4.3: Children nutritional status per sex (n = 408)

In the sample studied, 35.1% and 24.9% of boys and girls respectively were stunted. While 11.5% and 7.8% of them are respectively wasted. Stunting (p-value = 0.024) and wasting (p-value = 0.391) prevalence seem higher among boys (Figure 4.3), but not significant, whereas the girls overweight/obesity prevalence was slightly higher than boys.

4.4.2 Maternal nutritional status

To interpret the mothers' waist circumference measurement, they were divided into two groups: those with a high metabolic risk (WC > 88 cm) and those who are not (WC < 88 cm) (Table 4.6). Waist circumference mean is 79.95 ± 10.35 cm and 19.3% of mothers have high metabolic risk. Body Mass Index (BMI) was also evaluated, and it was noted that 16.9% of mothers were overweight, 7.4% were obese and 13.5% are underweight.

Table 4.6: Nutritional status of mothers

Mother nutritional status	**%**	**Mean ± SD**
Waist circumference (n = 388)		79.95 ± 10.35
< 88 cm	80.7	
> 88 cm	19.3	
BMI (Kg/m^2) (n= 408)		22.82 ± 4.31
< 18.5 (underweight)	13.5	
18.5-24.9 (normal status)	62.3	
25-29.9 (overweight)	16.9	
> 30 (obesity)	7.4	

Mothers who had a waist circumference greater than 88 cm and at risk of developing health problems had significantly higher BMIs when compared with the group with lower than 88 cm waist circumference. Despite the fact that of the sample (n = 388) used for analysing waist circumference, only 18% (n= 75) were in the risk group. See table 4.7 below.

Table 4.7: Mother's nutritional status and risk of metabolic disease

BMI (Kg/m^2) (n= 388)	**Waist circumference < 88 cm (n= 313) %**	**Waist circumference > 88 cm (n=75) %**	**P-value**
< 18.5 (underweight)	13	0	**< 0,001**
18.5 - 24.9 (normal status)	59	3.9	
25 - 29.9 (overweight)	7.5	8.5	
> 30 (obesity)	0.8	7.0	

Note: total prevalence adds to 100% (n=388)

4.4.3 Coexistence of undernutrition and overnutrition in child-mother pairs

The coexistence of malnutrition in child-mother pairs was determined using correlations illustrated in Table 4.8 below. This was done to establish the double burden of malnutrition in the same household.

Table 4.8: Correlation between nutritional status of mother and child (n= 408)

Variables	**Pearson- r**		**Spearman's rho**		**Comments**
	Value	**Sig**	**Value**	**Sig**	
BMI categories and WC categories	0.635	0.000			BMI and WC are positively strongly correlated. Result is significant with p-value < 0.0005.
BMI categories and wasting	0.102	0.039	0.118	0.017	BMI significantly correlate with wasting, but the correlation is weak.
BMI and wasting	0.156	0.002	0.137	0.005	
BMI categories and stunting	0.121	0.015	0.148	0.003	BMI significantly correlate with stunting, but correlation is weak
BMI and stunting	0.119	0.016	0.138	0.005	
WC and wasting	0.024	0.641			Wasting does not correlate with waist circumference of mother
WC and stunting	0.135	0.008			Stunting significantly correlate with WC but correlation is weak
Stunting and wasting	-0.116	0.019	-0.069	0.166	Pearson coefficient indicates negative weak correlation between stunting and wasting but it is significant

The multiple regression indicates that only 3% of BMI categories variation can be explained by stunting and wasting (R square = 0.028). It is a low correlation but there are significant predictors with p< 0.003 which is lower than to 0.05.

Figure 4.4 shows coexistence of child wasting and mothers overnutrition in households surveyed. Mothers who are overweight and obese have undernourished children. The double burden of malnutrition is present in the households. Results are significant with a p-value of 0.002.

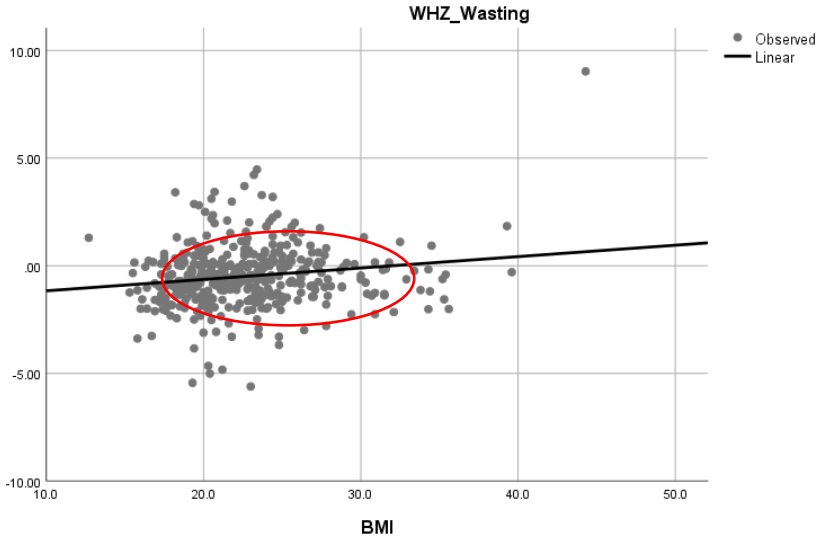

Figure 4.4: Coexistence of wasting and overnutrition in a household (n=408)

Figure 4.5 shows the coexistence of undernutrition and overnutrition in the household. Mothers with a high BMI have children who are undernourished. There are more mothers who are overweight with undernourished children, than obese mothers. Results are significant with a p-value of 0. 016.

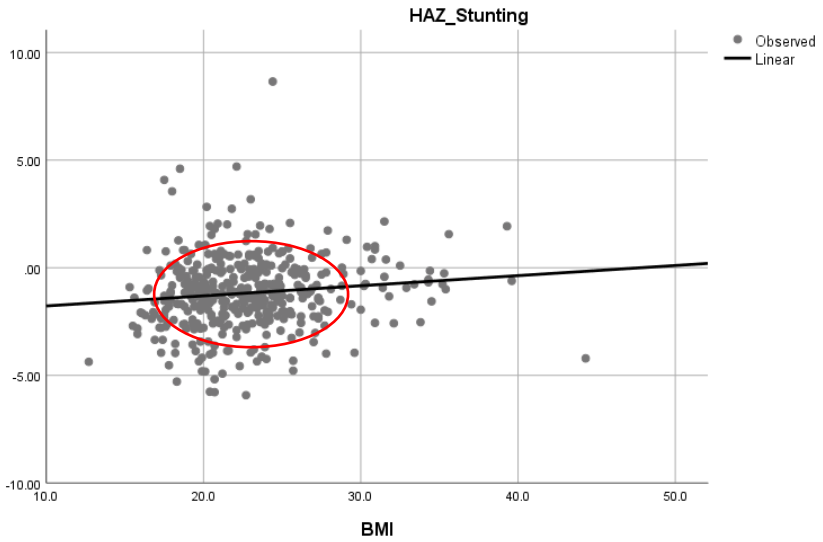

Figure 4.5: Coexistence of stunting and overnutrition in a household (n=408)

Figure 4.6 show that some mothers with high waist circumference have children who are stunted, this confirms double burden of malnutrition in these households. Results are significant with a p-value of 0.011.

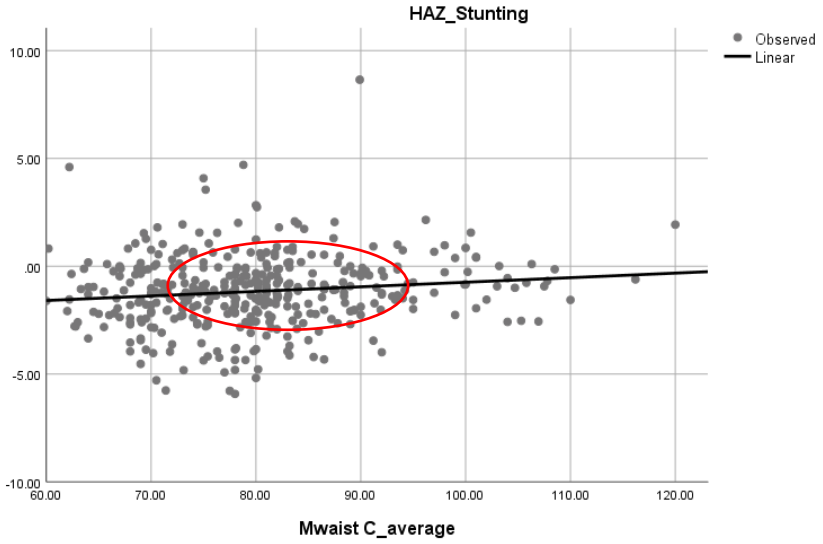

Figure 4.6: Coexistence of stunting and high waist circumference of mothers in a household (n= 408)

4.4.4 Relationship between socio-demographic and anthropometry

Statistical analysis revealed that only food expenses, drinking water, and type of sanitation are related with children nutritional status.

Table 4.9: Relationship between socio-demographic and nutritional status (n = 408)

Variables	Chi-square value		Pearson- r/ Spearman		Comments
	Value	Sig	Value	Sig	
Head of household with wasting	203.273	0.999	-0.060	0.230	Head of household is not significantly associated with stunting and/or wasting,
Head of household with stunting	271.516	0.531	0.024	0.627	
Food expenses per month with wasting	5359.558	0.995	-0.24	0.624	No significant relation with wasting
Food expenses per month with stunting	5404.482	1	0.099	0.045	Food expenses and stunting are significantly related
Type of sanitation with wasting	592.361	0.046	0.106	0.033	Significantly related
Drinking water with wasting	1433.329	0.038	0.049	0.323	Significantly related

Money spent on food have an impact on child nutritional status, specifically stunting. Also, the absence of proper sanitation and access to drinking water can explain the prevalence of wasting. There is a significant relation between wasting and the absence of proper sanitation and access to drinking water.

4.5. Feeding practices

The majority of children (86.6%) between 0 to 23 months were breastfed within 4 hours of birth (Table 4.10). Among children under 6 months, 56.1% were breastfed exclusively on average for 11.41 ± 6.33 weeks, while 94.8% of children aged 6 to 11 months continued to receive breast milk, and 69.1% of children aged 12 to 23 months were still breastfed. The mean age for introducing complementary feeding was 5.73 ± 3.01 months. 82.61% of children from 6 to 8 months were receiving solid, semi-solid or soft food. Children were introduced to a limited variety of complementary food: maize porridge (21.3%), *Ogui* porridge (14.5%), rice (18.5%), macaroni (11.3%), maize cooked *Owo* (stiff porridge) (60.0%), with Jute sauce (*Corchorus olitorius)* (48.5%), okra sauce (*Hibiscus esculentus)* (8.8%) or tomato sauce (22.5%). There was little consumption of animal protein (egg (1.2%), and fish (0.5%)), and fruits (0.2%) orange and papaya (0.2%). Only 33.8% of the children received porridge on the morning of the day of the survey.

Table 4.10: Feeding practices for children 0 to 23 months

Variables (the sample number is indicated in brackets)	%	Mean ± SD
Exclusively breastfeed (under 6 months) (n = 41	56.1	11.41 ± 6.33 weeks
Age of introducing complementary feeding 6 to 23 months (n = 168)		5.73 ± 3.01 months
Early initiation of breastfeeding (0 to 23 months) within 1 – 4 hours (n= 209)	86.6	
Continued breast feeding for children 6 to 11 months (n = 58)	94.8	
Continued breast feeding for children 12 to 23 months (n = 110)	69.1	
Ever breastfeed (n = 408)	100	
Introduction of solid, semi-solid or soft food for children 6 to 8 months old (n = 23)	82.6	

4.6. Foods most consumed by mothers and children

For the mothers' diet, maize cooked *Owo* (stiff porridge) is the most consumed starch (Table 4.11). It is consumed regularly by 96.6% of mothers and it is the staple food in most households. Whereas for the children's diet, maize cooked *Owo* is mostly consumed, with some other cereal-based foods a few times in the week. The other cereal-based foods are consumed by the mothers a few times a week were *Akassa* (30.4%), macaroni, spaghetti (18.4%), *Aklui* porridge (10%) and rice (5.6%). A similar pattern was true for the children. Cassava and its derivatives are eaten as *Gari* (81.4%), seems much appreciated by mothers and less so for chidren. Children were also given other starches like sorghum porridge, boiled maize and bread which were not reported for adults.

Mothers' consumption of animal products is limited to different varieties of fish and eggs. Smoked fish is the most consumed (35.3%) followed by fresh fish 20.1%, fried fish 18.6% and dry fish 18.4%. Fish and eggs are the only products of animal origin consumed by a few children. Beans as protein source are consumed (27%) weekly and red palm nut soup is cooked regularly (46.1%). The most used oil by mothers is red palm oil (79.9%) followed by refined oil (35.8%). Since children live in the same household, as mothers, their meals are often cooked with palm oil (57.6%).

Vegetables are consumed when accompanying main dishes, jute (68.9%), okra (40.9%) and African eggplant leaves (30.4%) are the most consumed and stewed with onion (87.5%) and tomato (51.2%) for the mother's diets. Children regularly consume jute sauce (66.9%) as an accompaniment of the main dishes Weekly fruit consumption was very low between 6.6% and 4.4% for orange and papaya respectively. Few children consume fruits, 12% coconut water, and 6.9% oranges. Some of the mothers consume traditional alcohol (*Sodabi*) (23.5%).

Table 4.11: Food consumption patterns of selected items (- denotes food items which were neither mentioned by mothers or children)

Food items description	Regular consumption (4 to 7x/week) %		Weekly consumption (1 to 3x/week) %	
Cereals	**Mothers (n = 408)**	**Children (n = 408)**	**Mothers (n = 408)**	**Children (n = 408)**
Maize cooked *Owo* (stiff porridge)	96.6	73.8	1.5	1.2
Maize fermented *Akassa* (stiff porridge)	30.4	18.9	21.3	14.5
Pasta (macaroni, Spaghetti)	18.4	18.6	25.2	21.8
Fermented maize-based gruel porridge *Aklui*	10	11	36	31.1
Rice cooked	5.6	12.5	46.6	37.7
Maize boiled	-	7.0	-	0.7
Fermented maize porridge (*Gbangba*)	-	4.4	-	1.2
Sorghum porridge	-	3.2	-	2.2
Rice boiled with beans	1.7	0.7	15.9	12.5
Slices bread	1	2.7	9.8	6.1
Loaf Bread	-	2.5	-	3.2
Ablo (cereal based dish made form millet)	-	0.5	-	32
Starchy roots, tubers				
Gari (from cassava)	81.4	52.9	9.1	10.3
Gari cooked *eba* (stiff porridge)	9.3	6.4	20.8	14.2
Cassava cooked (stiff porridge)	2.7	1	3.7	1.7
Cassava boiled	1	1	3.7	2
Tapioca (from cassava)	2.2	0.7		12.3
Potatoes	-	1.2	11.8	1.2
Legumes and nuts				
Red palm nut soup (*Denoussounou*) *Elaeis guineensis Jacq.*	46.1	35	36.3	26.5
Beans	4.4	5.4	27	23.5
Peanut fritter	3.2	1.5	4.9	2
Peanut Roasted	1.7	-	2.9	-
Soya (porridge)	-	1.5	-	1
Soya sauce	-	1.5	-	0.2
Eggs, Fish and Meat				
Smoked fish	35.3	28.4	20.8	15.4
Fresh fish	20.1	15.7	25.5	19.1

Fried fish	18.6	14.5	26.5	18.9
Dry fish	18.4	14.2	24.3	17.2
Eggs (poultry)	8.8	9.3	9.6	7.6
Sardines	-	-	1.2	-
Milk and products				
Dried milk	0.7		0.5	
Yoghurt	-	1.7	-	1.5
Vegetables				
Onion	87.5	64	7.4	6.4
Jute (*Ninnouwi*) *Corchorus olitorius*	68.9	66.9	15.9	5.6
Tomato	51.2	39.7	7.4	7.6
Okra (*Févi*) *Hibiscus esculentus*	40.9	32.4	16.4	10.8
African eggplant (*Gboman*) *Solanum macrocarpon L*	30.4	14.5	33.8	18.1
Cassava leaves (*Fingninman*) *Manihot esculenta*	1.2	1.2	18.6	6.1
Green bean	1.7	2	6.9	6.1
Fruits				
Orange	2.7	3.7	6.6	6.9
Sweet Banana	2.2	4.4	2.7	4.7
Coconut	1.2	2	6.4	5.4
Coconut water	1	2.5	17.2	12
Papaya	0.7	1.5	4.4	2.7
Guava	0.7	0.5	2.7	2.5
Fat				
Palm oil	79.9	57.6	10	9.6
Processed oil	35.8	24.8	8.1	4.4
Peanut oil	6.4	4.7	7.8	4.9
Beverages				
Traditional alcohol (*Sodabi*)	23.5	-	13	-
Akpan made from maize	2.7	4.2	11	12.3
Traditional drink sweated (*Tchakpalo*)	0.5	-	3.2	-
Fruit juice	0.2	0.7	1.2	0.5
Others				
Pepper (chilli)	80.1	34.8	1.7	1.2
Wheat fritter (*Yovodoko*)	30.4	28.9	29.9	28.7
Chocolate. Candy	1.5	2.9	7.6	13.5

4.7 Relationship between anthropometry and feeding practices

Stunting is related to the age where upon complementary feeding commences, it is weak relationship but a significant p-value (< 0.012) was obtained. For wasting, no relationship was found with breastfeeding and complementary feeding practices.

CHAPTER 5: RESULTS AND INTERPRETATION OF QUALITATIVE DATA

5.1 Introduction

In this chapter, the results of the qualitative data is presented and interpreted. This is to ensure that they are presented, synthesised and discussed as it is the case for qualitative data. Furthermore, they are presented and discussed first prior to discussion of the quantitative data, because there is integration of findings in the next main discussion chapter. The results are presented in tabular form using the themes identified.

The analysis of the data followed the steps by Creswell (2009) as indicated in Chapter 3. Furthermore, inductive reasoning was used. The data was first grouped according to the 13 discussion topics (used as codes) and focus groupings which were:

According to Discussion guide

1- What do you think is a healthy diet?
2- About breastfeeding?
3- Practices exclusive breastfeeding?
4- Food usually give to a child in a day
5- Foods that you think necessary for child growth
6- During the first year, feeding practices
7- Care practices and feeding during illness
8- Food distribution in your household (who is serve the first,
9- Understanding about foods taboos
10- Foods taboos, restrictions during pregnancy and breastfeeding (women)
11- Foods you eat especially during pregnancy and lactation for your good health or for your child's.
12- Foods young children cannot eat
13- Foods not eat during illness

The responses were then synthesized in terms of nutritional content and similarities and categorised according to the following themes relevant for feeding of a young child while keeping the focus groupings:

1. Healthy diet
2. Exclusive breastfeeding
3. First year diet

4. Growth foods

The focus groupings were kept to show that the responses were repeated by different groups. The interpretation on how the four themes impact on sociocultural practices then followed, and is presented under each table.

5.2. Results of perception, care practices and food taboos

Mothers between 19 and 60 years responded to questions during four group discussions in different areas. Some ideas and perceptions about nutrition, food and children care practices. The characteristics of the focus groups are illustrated in Table 4.12 below.

Table 4.12: Focus group characteristics

Groups	**Number**	**Age range**
One	8	20 to 60
Two	7	19 to 40
Three	8	20 to 40
Four	8	22 to 40
TOTAL	31	

During focus group discussions with mothers, they highlighted food taboos practiced in their communities, as well as some perceptions and misconceptions about child feeding. Several reasons have been given to explain why they avoid certain foods during pregnancy and refrain from feeding to their children. Their responses are organised in the following table 4.13 to 4.19. Their response are grouped according to themes: healthy diet, exclusive breastfeeding, first year diet, growth foods, care practices, food distribution, and taboos. The data is presented verbatim by focus group followed by an interpretation and synthesis of the statements.

Participants were asked to talk about their understanding of a heathy diet. The responses are listed by group in their own words.

Table 4.13: Focus groups discussion concerning a healthy diet

	Focus group 1	**Focus group 2**	**Focus group 3**	**Focus group 4**
Healthy diet	- See by the physical health of the individual - Eating spaghetti, maize paste, fresh fish sauce, vegetables, *egoussi* sauce (squash seeds) - Food consumed quality - When you are fine, you eat well - Cook food rich in nutrients	- Maize foods, rice, cowpea, egg, peanut - Maize stiff porridge has lots of vitamins. We eat at least once a day. - Eating food that make us feeling good.	- Eating paste and bitter leaves sauce, palm nut sauce, wild basil sauce, *gari* - What you eat, and you feel good that is eating well - A food that you prepare carefully, eat and that's give you nutrients and good health. Those nutrients your child receives through the breastmilk is a good diet.	- Eat good food. Cowpea, potato, *moringa* it is good for children's health

Interpretation: Starch and legumes were cited by most groups as part of a healthy diet. The feeling of eating food you appreciate and that one assumes nutritious, form part of healthy diet.

The participants were asked to share their knowledge on exclusive breastfeeding and their responses are listed in Table 4.15.

Table 4.14: Focus groups discussion concerning exclusive breastfeeding

	Focus group 1	Focus group 2	Focus group 3	Focus group 4
Exclusive breastfeeding	- One mother did it. But it was difficult because of environment. Most of mothers give water or porridge to children and old women don't allow young to do it. - Nurses taught them about it but they think baby is thirsty and need water even the same day of birth. - To do it you need to be strong in your mind and must have milk in your breast.	- What we eat is found in our milk, so the breastfeeding is good. All we breastfeed at least until 18 months. - I heard that milk contains lot of water for example 10ℓ of milk contains 9ℓ of water and 1ℓ of vitamins so if you give water to the child he will not have much vitamins - Milk alone is not enough for the child so I give him water. - When we go to the hospital we received advices but we all give water to children. They are thirsty and cry to ask for it. If you are with your grandmother she will say to give it. - Some of mothers give up at 18 months others 24 months, depend on each mother's feelings	- Breastfeeding is essential. Milk is for child. - Give up at 18 months or 2 and a half years. - My first child had drunk formula because I had a problem with my breast but the second one drank my milk. - No exclusive breastfeeding because child is thirsty he needs water. It's hot it's not easy for an adult what to say about child who cannot tell you if he is not fine. He cries and we give water. - They said breastfeeding exclusively is good but needs of the child are different. - Give water at 3 months. - For myself I wanted to give her milk alone but his grandmother gave him. When I refused she took him herself to give it to him. She did it the same day at her birth. Heat water to sterilize it and give it.	- Breast milk is good for children. It develops strength and intellect. They take up to 2 years. It's just knowledge. Doctors have taught us to give milk to children without water until 6 months. - Milk make children thirsty so we give water. - Breastfed exclusively up to 6 months after I make him imported porridge flour. But this child refuses porridge he prefers dough, rice. - Not exclusively breastfed my child. Weaning at 9 months with maize roasted flour.

Interpretation: Most participants seem to have breastfed their children for up to 18 months. Most said they gave water to the child before 6 months, thus not truly exclusive breastfeeding. Environment, time and misconceptions, and beliefs are limits for exclusive breastfeeding practice.

There was a discussion on which foods constituted the diet of a child during the first twelve months of his/her life.

Table 4.15: Focus group discussion concerning the diet of ‘n child’s first year

	Focus group 1	**Focus group 2**	**Focus group 3**	**Focus group 4**
First year diet	- Infant formula milk. - First food to give to child after milk should be cereals. - At 3 months, some start giving simple maize porridge or maize roasted porridge. - Others make flour with maize, soybean (roasted), biscuit, small dried fish (*dowevi*, *tcheke*) and grind it in small portion to see if infant like it. - Use also sorghum and maize, do not like soybean because it is not good for all children. - Can buy the porridge in the supermarkets. - Rice and macaroni.	- We feed child when we eat giving him portion by portion. - We start with maize porridge (flour and water) maize dough and jute sauce, macaroni to give it the taste of family meals and after it will be used. - You can give him egg sometimes or donut when he’s on the back so he sucks or eats. - It depends on the child and how he accepts eating.	- At 6 or 7 months, I start with porridge. - Eat the usual foods. - No time to give food especially. He will be taken off breast and when I want to eat I also give him if he could eat. - Maize porridge, paste and jute sauce, rice, macaroni, cowpea no egg frequently it is when we have money we buy it. - Maize porridge with maize flour and water. - Porridge and cow milk. I no longer give egg because I cannot afford to buy. We give fish and meat if present in the sauce.	- Macaroni, paste and jute sauce, rice, cowpea. - Child can eat cowpea at 10 months. - He couldn’t. He is too young for that. - He could. Just prepare it well and crush. Give meat and fish occasionally. Eat eggs regularly, at least three times a week.

Interpretation: Most mothers cited maize porridge as the first food followed by other foods or what the family eat. Their responses confirm the types of foods identified as regularly consumed in section 4.5.

There was also a discussion on the participants' knowledge on which foods contribute to growth in children.

Table 4.16: Focus groups discussion concerning growth foods

	Focus group 1	**Focus group 2**	**Focus group 3**	**Focus group 4**
Growth foods	- Meat, fish, cowpea not too much oil, milk, eggs. - If it is only *gari* and fresh fish you will give to your child, he won't grow. - Can also prepare vegetable sauce (African eggplant sauce) and put moringa in all foods.	- Cowpea, tilapia, avocado, banana, orange, fruits, vegetables - Just dough we give to our children and they grow up well. - We do not have processed milk for children. We only have our foods here. When one gives small fish, someone thinks that it is poverty.	- Paste, cowpea, macaroni, rice, okra and jute sauce, orange, fruit, banana, pineapple. - Pineapple is not good for kids it makes you lose weight is better for adults.	- Fish, vegetables, paste, jute sauce and palm nut sauce.

Interpretation: The participants identified protein sources especially fish, legumes, fruits and vegetables as growth foods. They know that common traditional foods can affect growth in their children.

There was a discussion concerning the participants' lived experiences about caring for their children.

Table 4.17: Focus groups discussion concerning care practices

	Focus group 1	**Focus group 2**	**Focus group 3**	**Focus group 4**
Care practices	- No special food. - Porridge most of the time. - Treatment at home until situation become worse. - Use herbal tea. - Tablets.	- If you have money you can go to the hospital otherwise you start treatment at home first with herbal teas or go to the healers. - It is more often treated at home first. - When it takes too long time for healing we go to hospital. - We give the usual food but more often porridge because at this moment child don't want to eat. We give him food if he doesn't like we try other things. - If it is the measles we don't give peanut. He does not wear clothes.	- Give mostly porridge, and some others like rice, paste if he likes. - We treat at home first, hospital is expensive. Go there when it is very serious and has worsened. - We give tablets we have at home. - We prepare herbal teas. Grandmothers show us leaves and we prepare. We give as drink or wash them with. The fever goes off quickly.	- We treat at home first we prepare herbal tea if after three days he is still sick we go to the hospital. - He eats usual food and what he likes. When they are sick, they don't take foods too fat. It is not good. - When they cough or have digestive problems they cannot eat okra.

Interpretation: Most mothers said they treat their children at home using tablets or herbal tea and only go to hospital when the condition worsens. They also said that they get or listen to advice from the children's grandmothers on how to care for their children. They primarily give maize porridge to the child during sickness and when he/she gets better, normal family food is given.

Food distribution in the household was discussed, with special reference to children feeding practices.

Table 4.18: Focus groups discussion concerning food distribution

	Focus group 1	**Focus group 2**	**Focus group 3**	**Focus group 4**
Food distribution	- Children received first and then men are served. - As soon as you finish preparing you serve them.	- Children are served first immediately you finish cooking. - Fathers are outside they may have found something to eat outside and child would be fasting at home? Children are served first. - They are served first but the large portions of meat or fish are reserved to fathers.	- Dad is served first. Dad's portion is first removed after cooking. - It is children who is served first. They are hungry and need more food than adults. But it's for dad the best part, the big fish/meat. - Serve my children first after their father and I.	- Children are served first. - Children are served first and after men are served but the good portion of fish or meat is reserved to the father.

Interpretation: Most mothers said children are served first, but the men receive the 'best' part of the meals, and in some households the men are served first, or their portions are removed before serving the children and other members of the household.

Cultural food taboos were discussed.

Table 4.190: Focus groups discussion concerning food taboos

	Focus group 1	**Focus group 2**	**Focus group 3**	**Focus group 4**
Taboos	- Our community does not eat crabs, catfish that families do not take. There are family totems. - The egg is not good when you are pregnant because you can quickly give birth. - When you breastfeed, you do not eat African eggplant, mango. They give digestive problems. - Don't give eggs to child frequently. When you have sometimes you can give him if not it is not possible because too expensive. The reason you have poultry is for herd increasing and sell it after chicken.	- Not everyone has taboos. - If I eat something and I do not digest well, I do not eat anymore. I don't have taboos, do not eat catfish. - Do not eat catfish we do not eat pork, dog, cat, snake meat in my family but I eat as soon as I find. - When we are pregnant we do not eat cane rat (giant rats). - We do not eat wild meat, so children do not become violent and behave like a wild animal. - We do not eat local eggs because you can have a dead child because they will not be glad that you take his progeny. We can eat imported eggs. Also, kids can break things like hen so it's best not to eat them. - We drink maize porridge and dough to have lot of milk.	- Do not eat African eggplant sauce that gives digestive trouble and diarrhoea. - No eggs during pregnancy. We can eat but whole, we couldn't share with someone else. - A pregnant woman should not prepare eggs and give to someone. She must cook for herself and when she removes the shell it should not have any hurt otherwise she should not eat because she might have birth complications. - Pork is taboo for Muslims and some families. - Dog, cat, catfish, jute sauce with palm oil. There are no explanations, we got it from ancestors. - No taboos only dog and pork meat if not I eat everything. But when pregnant I do not like anything.	- Pork and dog is my family totem. - Sheep. - Varanus, crab, anyone in this community don't eat catfish. - Pregnant I do not eat fish it gives me nausea just the paste and chilli. - Pregnant I eat everything. It is said that we should not to eat eggs to avoid birth complications. - When we are breastfeeding, it is recommended to eat maize dough, African eggplant, Bitter leaf, maize fermented porridge. - For some, they think if you give rice or cowpea to child he will have digestive problems, but it depends on what you teach to your child. - When breastfeeding, we do not eat banana, mango, papaya to avoid colic in children. - We eat a lot of *moringa*. We were visited by people who taught us that it is good for children.

Interpretation: Catfish, crabs, eggs, pork, and African eggplant were cited by many as taboo foods, especially for pregnant women. Some foods which are rich in nutrients are forgotten because of cultural or religious beliefs.

5.3 Synthesis and interpretation of socio-cultural practices

Through the focus groups conducted, mothers' knowledge about nutrition, care practices, food distribution within household, and food taboos were discussed. The results showed that mothers have limited knowledge about nutrition. For the majority who did not go to school, the source of information remains the elders and the cycle is perpetuated. Concerning a healthy diet, one of the mothers said that: "*manger bien se voit à la santé physique de l'individu* ", in English: "*Health diet is seen by the physical health of the individual*". Another one said that: "*c'est manger des aliments importes et des produits animaux"*, in English: *"Eating processed foods and animal source foods"*. Despite some nutrition education sessions during hospital care visits, mothers do not apply the recommendations. Either because they say they do not have time, or because their family environment does not allow for it. For example, in focus group three, the mother has the will to exclusively breastfeed her child, but the mother-in-law refused and gave water to the child from the first day. She said : "*pour moi, je voulais lui donner que du lait maternel mais sa grand-mère lui a donné de l'eau. Quand j'ai refusé, elle l'a pris elle-même et le lui a donné le même jour de la naissance.* ", in English: "*For me I wanted to give him milk only, but her grandmother gave him water. When I refused she took him herself to give it to him. She did this the same day of his birth*". The belief that breast milk cannot satisfy the child's thirst remains persistent and as soon as the child cries, he receives water. One of the mothers said: "*No exclusive breastfeeding because child is thirsty he needs water. It's hot it's not easy for an adult what to say about a child who cannot tell you if he is not fine. He cries, and we give water*". Another one said: *"Babies are thirsty and cry to ask for water. If you are with your grandmother she will say give it"*.

Social norms have a great impact on the quality of care provided to children, by their mothers. There is saying in West Africa that the whole family is responsible for supporting the child while growing up. The first year of the child's life is a delicate time that all mothers recognise. They introduce the child to adult food from as early as three months, or later, five or six months. These foods include cereal porridge, which is mostly derived from maize. A simple cornmeal is given to the child several times a day, in addition to breast milk. This porridge is low in protein and fat and the child would therefore require additional sources of these nutrients. Some affordable porridges for complementary feeding have been formulated to fulfil the nutritional needs of children from 6 months and older (Muhimbula et al., 2011, Tshite, 2015). A mother from focus group one stated: *"Others make flour with maize, soybean (roasted), biscuit, small*

dried fish (dowevi, tcheke) and grind it in small portion to see if infant like it". In focus group two, one said *"We start with maize porridge (flour and water) maize dough and jute sauce, macaroni to give it the taste of family meals and after it will be used"*.

Poor child feeding, and care practices are associated with poor child nutritional status (Kimani-Murage et al., 2014). When a child is ill, the first action of the mother is to treat him/her at home with traditional medicine. They go to the hospital only when the child's condition worsens, after at least three days. As this mother from focus group three said: "*We treat at home first, hospital is expensive, and we go there when it is very serious and has worsened*".

The way in which food is distributed in the household influences the nutritional status of the child. When distributing meals, especially fish, adults (often the father) are often favoured with the best part (Akerele, 2011; Wibowo et al., 2014). A mother from focus group four said: "*Children are served first and after men are served but the good portion of fish or meat is reserved for the father*". Another mother said: "*Dad is served first. Dad's portion is first removed after cooking*". Another one declared: "*Fathers are outside they could have found something to eat outside and child would be fasting at home? Children are served first* ".

Food taboos and misconceptions about food use, contribute to the high levels of undernutrition. In fact, it plays a significant role in determining the diets of pregnant and lactating women, infants, and young children. In the community studied, there are food taboos but it is no longer respected by many. Some families or members of certain religions define some food items as appropriate for consumption and others less so (Denning and Fanzo, 2016). They have food taboos such as not eating pork or dog meat. One of the mothers said: "*Pork is taboo for Muslims and some families. Dog, cat, catfish, jute sauce with palm oil. There are no explanations, we got it from elders.*".

Furthermore, there are dietary restrictions during the period of pregnancy where women avoid nutritious foods for reasons such as not having a big baby, facilitating labor and delivery, or not having a child which avoids certain foods. The study revealed that eggs, cane rat, and wild meat were avoided. Long and hard labour was the reason given for avoiding it. Ekwochi et al., (2016)

report similar findings in his study on food taboos and myths in South Eastern Nigeria. Similarly, Gambian women do not eat catfish during pregnancy to prevent giving birth to a dribbling baby (Pérez & García, 2013). Long and difficult child labour was the main reason given for avoiding it (Ekwochi et al., 2016). While breastfeeding, mothers eat some foods to have more and more nutritious milk but avoid other foods such as bananas, papayas, and mangoes. These dietary restrictions reduce the potential intake of proteins, vitamins, and minerals which are essential for growth and development. These nutritional habits also have an impact on the nutritional status of the child, as the child receives all his/her nutrients from the mother, whether the child is still in the womb, or already breastfeeding.

CHAPTER 6: DISCUSSION

6.1 Introduction

The study described the presence of malnutrition in the Grand-Popo district. The hypothesis that double burden of malnutrition coexists in the same household and that there is relationship between sociodemographic factors, nutritional status, eating patterns, and sociocultural practices were investigated, using various indicators. After data analysis, findings reveal double burden of malnutrition and how some factors are related to children's stunting and wasting.

6.2 Socio-demographic and household parameters

From the results obtained, the researchers observe that most of the households are led by a male figure, three quarters of the participants are married in monogamy relationships. Households seem to provide an appropriate setting for raising children. However, a large household size may be a risk factor contributing to malnutrition in young children (Basit et al., 2012, Owoaje et al., 2014). Approximately two thirds of households have between two and five people while one thirds have between six and thirteen people. Thus, in this study, most households were of average size. It has been shown that the quality of child care in a household where there are many children is impaired, since the mother can only devote a little quality time to each of them (Ajao, 2010). The education level of the mother is linked to the nutritional status of the child. Numerous studies reported that stunting and wasting among children with illiterate parents were higher than those with parents having higher education (Mushtaq et al., 2011; Wong et al., 2014; Kimani-Murage et al., 2015; Zhang et al., 2016). This study showed low levels of literacy with one thirds of mothers having up to primary level and two fifths with no education.

The father decides in three fourths of households about food purchasing. Their salaries, in 68.6% of cases, could affect the access of the household to nutritious food, and compromise the good growth of children. Most households have a monthly income of $60 and spend about half on food. Various studies have indicated that low household income has a direct impact on the nutritional status of the children (Mengistu et al., 2013; Demissie, 2013; Ma'alin et al., 2016). Choosing to buy foods depend on the father, there is thus a risk of malnutrition since women can supply more nutritious food to the children when they control the variety when purchasing food. Women's status in the household influences their household income, their confidence and self-esteem (Smith & Haddad, 2015, Bhagowalia et al., 2012a). Access to sanitation was seen

to be very low in this study area and is a known contributing factor in the development of diseases in children due to lack of hygiene. The lack of access to healthy an environment and drinking water contribute to undernutrition (Rah et al., 2015). In this study, for many households, the main source of water was wells and communal taps, while they used paraffin, oil, and firewood for energy. These are characteristics of low socio-economic households.

6.3 Nutritional status of children and their mothers

The results of the study showed a 9.8% prevalence of wasting, which is higher than the national average of 4.7%. This prevalence reveals the existence of a nutritional problem and calls for drastic measures to prevent a rise in the situation. The prevalence of stunting is very high at 29.7%, which is not far from the national prevalence, and similar to the prevalence of stunting in the West African sub-region (31.4%) (UNICEF & WHO, 2017) and sub-Saharan Africa (Akombi et al., 2017). Africa has a high prevalence of stunting, and West Africa has a high prevalence in peri-urban areas. According to WHO, the prevalence of 9.8% wasting and 29.7% stunting, in terms of severity, is a medium health concern. Malnutrition is more often higher in rural areas than urban areas as Herrador et al., (2014) and Saeidlou et al., (2014) showed in their studies. The high number of children studied in peri-urban areas in this study may explain the high rate of malnutrition because of high prevalence of malnutrition in this area. One must also take into consideration that these areas boarder the ocean, therefore, they have fewer food resources. When considering gender, it was seen that malnutrition was more prevalent among boys than girls, these results concurred with a study by Asfaw (2015), where the difference for stunting was also significant. According to the age groups of children, children from 0 to 5 months were significantly less stunted. They are still young and have time to grow. Low breast milk intake or early introduction to food may explain the 12.2% wasting in that group. In many countries, some interventions in nutrition were implemented to save children life and future. They are focus on undernutrition prevention and treatment (Fenn et al, 2015; Ahmed et al., 2012; Bhutta et al., 2008).

Obesity, at a low rate, was also present among children. It is not negligible, and attention needs to be paid, as other studies showed, the occurrence of overweight children is rising, even in Africa (Kirsten, 2011; Black, 2013; Melzer et al., 2015). Approximately 16.9% of mothers in this study were overweight and 7.6% obese, mimicking the national trends from the health

survey in 2012. These figures relate to the figures found in the department where Grand-Popo is located (19.9% overweight and 12% obesity) (EDS, 2012). Maternal obesity is emerging as a public health problem, and the occurrence of overweight/obesity are rising in sub-Saharan Africa (Ajayi et al., 2016).

Over the years in Benin, as evidenced by the figures between 2006 and 2012 in the Mono Department, overweight among women aged 15 to 49 increased from 8.1% in 2006 to 19.9% in 2012. In his study on the changes in the prevalence of underweight and overweight/obesity among non-pregnant women aged 15 to 49 years in Addis Ababa, Ethiopia, Tebekaw reported a 28% increase in overweight/obesity between 2000 and 2011 and a 20.9% decrease in underweight for the same period (Tebekaw et al., 2014).

Overweight or obesity exposes individuals to chronic diseases, but Body Mass Index (BMI) does not seem to be the best indicator for assessing the risk of having metabolic diseases. Waist circumference is preferred to determine abdominal obesity and to characterise the risk of cardiovascular diseases (Huxley et al., 2010). About 19.3% of mothers have high metabolic risk in this study. They are therefore at risk for cardiovascular disease and type 2 diabetes. Among overweight mothers, 44% have a very high risk of developing metabolic diseases.

Regression analysis results show the presence of overweight mothers and stunted or wasted children in the same household. This study confirmed our first hypothesis that underweight, and overweight coexist in the same household. Similar to what was revealed by Oddo et al., (2012), an undernourished child and an overweight mother within the same household were observed in 11% of the households in rural areas in Indonesia and 4% in Bangladesh. In a study in the Orang Asli villages, of Peninsular Malaysia, about 26% of overweight and obese adults coexist with high proportions of underweight (49%) and stunted (64%) children (Wong et al., 2015). The researchers observed 29.7% stunting, 9.6% wasting and at the same time 24.3% overweight and obesity. The researchers can conclude that the presence of double burden of malnutrition in some areas in Benin is a reality.

These results prove the coexistence of different forms of malnutrition, both overnutrition and undernutrition, in the same environment. Malnutrition in children is already a serious problem which nutrition interventions should focused on. With this coexistence, it will be necessary to revise the strategies to fight obesity and include it in the prevention plan.

6.4 Dietary patterns and socio-cultural practices of children and their mothers

Exclusive breastfeeding during the first six months of life protects against infant morbidity and mortality. The majority of children in this study was breastfed but only 56.1% were breastfed exclusively for six months compared to a national prevalence of 41.4% (UNICEF, 2016). This result is consistent with those found at Hidabu Abote in Ethiopia (48.7%) (Mengistu et al., 2013). It is inappropriate feeding practices not to exclusively breastfeed but very common. The results of our study show how it is difficult for mothers to adopt exclusive breastfeeding because of family pressure and beliefs as described by mothers during focus groups. So, for one of the mothers: “to do it you need to be strong in your mind and must have milk in your breast”. Another mother said: “No exclusive breastfeeding because child is thirsty he needs water. It's hot it's not easy for an adult what to say about child who cannot tell you if he is not fine. He cries, and we give water” Beliefs have a great impact on child care practices as mothers receive advice from older women. Thus, mothers have misconceptions about breast milk despite the advice given by nurses: “Nurses taught them about it, but they think baby is thirsty and need water even the same day of birth” because of difficulty for them to practice exclusive breastfeeding, the nutritional education of babies will have to involve fathers as well as grandmothers in order to create a supportive environment for mothers. Despite nutrition education by health worker, various inappropriate infant feeding practices were identified, namely lack of exclusive breastfeeding, early introduction of complementary foods, no diversity of foods.

The study showed that the diet of many household was composed of cereals, roots, tubers and roots products, legumes and nuts, eggs, fish, vegetables and oil. The findings are similar to West Africa research findings of Zeba et al., (2014) and Frank et al., (2014). Zeba et al., described dietary pattern in Ouagadougou’ adults in Burkina Faso as high in local cereals, legumes, and traditional green leafy vegetables (Zeba et al., 2014) while Frank et al., (2014) characterised the urban Ghana dietary pattern as high intakes of plantain, green leafy vegetables, beans, egg,

fish, maize, palm oil, okra and fruits. Generally, when the child is introduced to food, they start with a porridge, like it is observed in this study where they gave to children a simple porridge made from maize. It is based on cereal less rich in protein and fat. Kweku in her study showed that children between 6-11 months in Akatsi district, Ghana received breast milk and *koko* (porridge from fermented maize) (Kweku, 2015). Mothers tend to give mostly *Owo* (stiff porridge) accompanied by local vegetables soup to the children who are on the family diet. Their diet is in most cases totally lacking in animal protein and fruit sources. This seems to be common eating habits in the community, so surveyed children received very little animal source food, only smoked or fresh or dried fish. They cited fish as child's growth food. Lack of funds and cultural believes limit the consumption of animal protein. "*Our community does not eat crabs, catfish that families do not take. There are family totems" said one mother about taboos in their community.* And *they "do not eat wild meat, so children do not become violent and behave like a wild animal*". Good sources of proteins are thus impossible to consume. Another mother explained that they*:* "*Don't give eggs to child frequently. When you have sometimes you can give him if not it is not possible because too expensive*". Mothers also have a diet identical to children with the staple food *Owo* (stiff porridge) accompanied by local vegetables soup. Thus, the top 11 foods regularly consumed were similar. For the mothers, some variants are raised because of the age and they can consume more than young children. Fruit consumption is also very low among mothers, and understandably, they do not give to their children frequently.

In Ghana, it is reported that 20% of high school students aged 12 to 18 years did not eat any fruit, and 13% did not eat any vegetables (Doku, 2013). WHO recommends the intake of at least five servings of fruit and/or vegetables daily or ≥400 g daily (Nishida, 2004). Several national and sub-national surveys have demonstrated the low consumption of fruit and vegetables in West Africa (Nago, 2010; Layade and Adeoye, 2014). Income, non-availability, non-affordability and access determine consumption of fruit and vegetables (Bosu, 2014). Promoting fruit consumption would therefore appear as a promising strategy for the prevention of disease. The main source of animal protein consumed is fish. This is understandable considering that it is a fishing community and fish is available permanently in the households. Meat consumption is just occasional at events or parties in this study. In low-income countries, meat and milk products are often lacking in the diets of children. Yet the benefits of their consumption especially meat has been shown that it improved growth indicators, micronutrient

status, and cognitive performance (Dror and Allen, 2011). The low consumption of meat can be explained by household income, accessibility, religious and cultural beliefs as seen in our study.

6.5 Relationship between environmental and nutritional status variables

The study revealed that the sex of the head of the household was not associated with child nutritional status, as seen in Mukabutera et al.'s study (2016) in Rwanda. Food expenses was associated with stunting but not to wasting. One can suppose that money reserved for food in the household have a more pronounced impact on long term malnutrition. The less is spent on food, the higher the impact on malnutrition. A previous study demonstrated that a higher weekly per capita household expenditure was positively associated with maternal and child double burden (Oddo et al., 2012). Household access to an improved source of drinking water and sanitation were positively related to wasting. These relations were similar to findings in a study conducted by Rah et al., (2015). Access to drinkable water and sanitation facilities have a great impact on children's health and nutritional status.

6.6 Summary

The study showed 9.8% of wasting prevalence, 29.7% of stunting prevalence and 24.5% overweight/obesity among mothers. The prevalence of wasting and stunting are both of medium severity according to WHO (2009) and a public health concern. Also, findings reveal double burden of malnutrition within the same household confirming our research hypothesis. Wasting was related to access to water and sanitation facilities. Stunting was associated with food expenses. Possible ways to reduce this burden of malnutrition could be nutrition education, ensuring conditions for optimal fetal and early child development, and reducing poverty.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This study was conducted to investigate double burden of malnutrition at household level in Grand-Popo where children undernutrition is known to be rather high. The main aim of this study was to investigate the sociocultural practices, feeding practices, dietary patterns and the presence of malnutrition in children and their mothers in Grand-Popo, Benin. The study population included children under five years and their mothers. The sample included 408 individuals. A questionnaire was used for data collection. The anthropometric method used, included height, weight, and waist circumference measurements to assess the nutritional status of infants and their mothers. The Statistical Package for Social Sciences software package version 25 were used for data analysis. Seven districts were surveyed in two different areas with 68.9% of households in rural areas, in 77.9% of households the head of the household is male and decides how to spend money on food. Water from wells and manual pumps are used but they do not have access to toilet facilities. Prevalence of stunting and wasting were estimated with prevalence of obesity in mothers. Results showed the coexistence of malnutrition and the relationship between age of complementary feeding, type of toilet, and stunting. The majority of children (86.60%) between 0 to 23 months are breastfed. The children's diet is mainly based on cereals, occasionally accompanied by leafy vegetables. For mothers, maize cooked *Owo* is the staple food in most households. Fruit are not frequently consumed by both children and mothers. Food taboos limit the sources of protein animals consumed. Most mothers said that they treat their ill children at home with tablets, or herbal tea and only go to hospital when the condition worsens.

7.2 Conclusion

This study confirms a coexistence of child undernutrition and maternal overnutrition in the same household. Food expenditure, toilet access, and access to drinkable water were positively related to child nutritional status. The following hypotheses were confirmed:

a) There is a coexistence of underweight and overweight in Grand-Popo, Benin,

b) There is a positive relationship between some sociodemographic factors, nutritional status of children, dietary patterns, and sociocultural practices.

In Grand-Popo, a 9.8% prevalence of wasting and a 29.7% prevalence of stunting were revealed. This prevalence is a moderate public health concern and there is a great need for intervention to save the future of these young children. A high prevalence of stunting is reported in the age group 12 to 23 months and 24 to 35 months, 39.1% and 35.4% respectively. Among mothers, 19.3% had a waist circumference greater than 88 cm with a high metabolic risk, 16.9% of mothers were overweight, and 7.4% were obese. Overweight and obesity prevalence is high and do not bode well in a country where child malnutrition remains high and persists.

The dietary patterns of children and their mothers are based on local foods: cereals, roots and tubers, vegetables, and fish. Their diet is monotonous and low in vitamins because of the low consumption of meat, fruits, and vegetables. Our study concludes that the coexistence of different types of malnutrition in the same household denotes a dual burden of malnutrition that may result in chronic diseases later in life. While addressing undernutrition, notice should be taken that the presence of overweight and obesity are on rise. Many interventions are focused on one aspect of malnutrition, treatment of undernutrition but it is necessary to raise awareness about the challenges surrounding obesity to avoid an alarming situation later in life. Similar to undernutrition, overweight and obesity represent a significant burden for national budgets, in terms both of direct and indirect costs. On basis of our findings, interventions should be focused on the household, as cultural norms are a barrier.

7.3 Limitations of this study

The findings of this study may not be generalised to the whole country but could be used for similar areas and instigate the improvement of nutrition programmes, and consider uplifting the double burden of malnutrition.

Data collection occurred in French where after it was translated in *Mina* (local language) during interviews and focus group discussions. For analysis, the data were translated into English. Quality checks of the French and English were done by the researcher. However, it is known that the gist of words could have been lost in the transcription and translation.

7.4 Recommendations

It would be beneficial if the authorities organised nutrition education sessions in small communities to help mothers improve family diets, based on local foods. Involvement of men, religious and local authorities, as well as older women (grandmothers) would be an asset in adjusting diets all the while still respecting the culture of the environment.

Poor and monotonous diets are risk factors for diseases. Diversification of agricultural production should be encouraged, and political decision-makers should encourage the accessibility of diverse agricultural products.

Effective awareness of the local authorities of Grand-Popo's nutritional situation in their localities, and their involvement is vital to facilitate nutritional interventions.

Further research could investigate the relationship between the nutritional status of the child and the nutritional status of the father. Also, investigating the impact of the addition of more animal-derived protein to the diets of children aged 5 to 6 years, on the decrease in stunting prevalence and double nutrition burden.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE (English)

TITLE OF THE RESEARCH PROJECT:

TOPIC: An investigation of social-cultural practices, the presence of the double burden of malnutrition, and mothers' and their children's eating patterns in Benin

Department: ……

City: ……

District: ……..

Village: ……

Sector: (Urban 1 Rural 2) ……

QUESTION		CODE
Date of interview (dd/mm/yy)	/___//___//___/	
Household ID		
INTERVIEWER IDENTITY		
Code		
SECTION A- HOUSEHOLD INFORMATIONS		
1) Who is the head of household?		
2) Mother's code		/____/
3) Mother's age (months)		/____/
4) Contact number		
5) Child's Code		/____/
6) Child's date of birth	/___/ /___//___/ (dd/mm/yy)	
7) Child's age (months)		/____/
8) Child's sex	1. Male 2. Female	
9) Child's birth weight	_____\	
SECTION B – ANTHROPOMETRY		
10) Maternal weight	1).....kg 2) …..... kg Average.……..….kg	
11) Maternal height	1) .....cm 2) .....cm Average …….....cm	
12) Maternal Waist Circumference	1) .....cm 2) .....cm Average.……. ….cm	
13) Child's weight	1) .....kg 2) ..... kg Average …. ……kg	

14) Child's height	1) .....cm 2) .....cm Average ……...cm	
15) Child's length	1) .....cm 2) .....cm Average …… cm	
SECTION C- SOCIAL ECONOMIC STATUS		
16) What is your marital status?	1. Single 2. Married/Living with partner 3. Separated 4. Divorced 5. Widowed 66. Others (specify): _____	____\
17) What is type of your marriage	1. Monogamy 2. Polygamy	____\
18) How many children do you have?		____\
19) How many < 5 years old children do you have?		____\
20) Number of persons usually resident in the HH (including you)	_____Adults numbers (≥ 18 y) _____teens numbers (12 ≤ years < 18) _____children numbers (< 12 y)	
21) What is mother's education level?	1. None 2. Only alphabetisation 3. Primary school 4. Secondary school 5. University	____\
22) What is your job?	1. Housewife 2. Government employee 3. Private sector employee 4. Police or Military 5. Trading or entrepreneur 6. Farmer (land owner) 7. Farm worker 8. Artisan 66. Others: _____	____\
23) What is father's job?	1. Government employee 2. Private sector employee 3. Police or Military 4. Trading or entrepreneur 5. Farmer (land owner) 6. Farm worker 7. Fisherman (boat owner) 8. Fisherman worker 9. Artisan 66. Others: _____	____\
24) What is your main source of income?	1. Salary (permanent employment) 2. Salary (daily or temporary) 3. Trade 4. Help, assistance 5. Husband 66. Others (specify) _____	____\

25) What is the main source of income of your husband?	1. Salary (permanent employment) 2. Salary (daily or temporary) 3. Trade 4. Help, assistance 5. Spouse 66. Others (specify) _____	____\
26) How much is your household average income?	1. < Fcfa 30 000 (US$ 60) 2. Fcfa 30 000-100 000 (US$ 60- US$ 100) 3. > Fcfa 100 000 and more (US$ 100)	____\
27) Who decides how much money is spent on food for this household?	1. Father/in law 2. Mother/in law 3. Husband/Partner 4. Yourself 5. Others (specify): _____	____\
28) How much is the average of household food expenses per month?	/_____/	
29) Do you have this item in your house? (Read the choice and put a tick for true answer)	1.Yes 2.No	/____/
29.1) Radio/Tape		
29.2) Television		
29.3) Phone/Hand phone		
29.4) Fridge		
29.5) Computer/laptop		
29.6) Bicycle		
29.7) Motorcycle		
29.8) Car		
29.9) Commercial car		
30.1) Do you (or someone in your household) have domestic animals? (Poultry, mutton, …)	1.Yes 2.No	
30.2) If yes, which type?		
31) Do you have in your household?	1.Yes 2.No	/____/
31.1) A plough land		
31.2) A plough land to rent		
32) How many rooms does this house have under one roof? (excluding bathroom/ toilet)		
33) What is your status in the dwelling that you occupy?	1. Land owner 2. Family house 3. Tenant 4. Free housing 5. Staff housing 66. Others: _____	____\

34) What is the material of the house's floor (the investigator himself)?	1. Soil, sand, stone 2. Cement 3. Tiles, marble, ceramic 66. Other (specify)) _____	____\
35) What is the material of house's wall (the investigator himself)	1. Palm branch, cardboard, oilcloth 2. Wood, bamboo 3. Sheet metal 4. Clay 5. Semi Hard / terracotta 6. Cement Brick 66. Other (specify); _____	____\
36) What is the material of the house's roof (the investigator himself)?	1. Straw 2. Sheet metal 3. Slab (concrete) 4. Tile 66. Other (specify): _____	____\
37) What is your main source of lighting?	1. Electricity 2. Paraffin Oil 3. Generating set 4. Solar panels 66. Others: _____	____\
38) Do you have an additional source of electricity	1. Electricity 2. Paraffin Oil 3. Generating set 4. Solar panels 66. Others: _____	____\
39) What fuel is used for cooking most of the time?	1. Firewood 2. Charcoal 3. Paraffin Oil 4. Gas 5. Electricity 66. Others: _____	____\
40) Where do you get drinking water most of the time?	1. Bottled water 2. Tap water 3. Drilling with manual pump (public fountain) 4. Wells 5. Surface water (river, pond, lake) 6. Tank 7. Rainwater 66. Others: _____	____\
41) What type of toilet does this household have?	1. modern latrine (flush) 2. Pit 3. No facilities 66. Others (Specify): _____	____\
SECTION D- EATING PATTERNS		
42) Do you smoke?	1.Yes 2. No	____\

43) Do you drink alcohol (e.g. spirits, beer, wine)?	1.Yes 2. No	____\
44) How often do you prepare meals at home?	1. Two or more per day 2. Once per day 3. Three to five per week 4. Once per week	____\
45) How many meals do you usually eat per day?	1. Five 2. Four 3. Three 4. Two 5. One	____\
46) At what times do you usually, eat your meals? (more than one answer are possible)	1. Breakfast 2. Snack 3. Lunch 4. Supper 5. Snack	____\
47) Who decides for buying food at home?	1. Yourself 2. Husband 66. Others (specify): _____	____\
48) How often do you buy food at home?	1. Everyday 2. 3 - 5 times a week 3. Less than 2 times a week 4. Fortnight 5. Once a month	____\
49.1) Do you have a vegetable garden at home?	1.Yes 2. No	____\
49.2) Which vegetables do you grow?		
50) Who is responsible for the preparation of meals	1. Yourself 2. Housemaids 3. Others: _____	____\
51) Do you eat outside	1. Yes 2. No	____\
52) When you eat out of the house, where do you eat most often? (More answers are possible	1. Restaurant 2. Maquis/ Cafeteria 3. Street 4. Work / company cafeteria 66. Others: _____	____\
53) For what (s) reason (s) do you eat out of the house? (more than one answer are possible)	1. Work far from home 2. Nothing to eat at home 3. Do not want to eat food from home 4. Others (specify): _____	____\
54) At which frequency do you eat fried food	1. Every day 2. Many times per week 3. At least one time per week 4. Each month 5. Rarely/never	____\
55.1) Have you ever attended any educational talk about nutrition?	1. Yes ⟶ 57.2) 2. No ⟶ 57.3)	____\

55.2) If Yes, through which type of source?	1. Radio 2. Television 3. Newspapers, journal, revues 4. books 5. health professionals (dietician, nurse, doctors, nutrition adviser) 66. Other (specify): _____	____\
55.3) If No, would you attend educational talk about it?	1.Yes ⟶ 57.4) 2. No	____\
55.4) If Yes, through which type of source? (More than one answer are possible)	1. Radio 2. Television 3. Newspapers, journal, revues 4. books 5. health professionals (dietician, nurse, doctors, nutrition adviser) 66. Other (specify): _____	____\
56.1) Do you have any food intolerance or allergies?	1.Yes 2. No	____\
56.2) If yes, which one?		
57) Do you ever take supplements?		

SECTION E- BREASTFEEDING AND COMPLEMENTARY FEEDING		
QUESTION		**CODE**
58.1) Did you ever breastfeed your child?	1.Yes 2. No	/____/
58.2) If YES, how long did you exclusively breastfeed] (BREASTMILK ONLY WITHOUT EVEN WATER)? only breastmilk offered, no formula or solids given at the time.	1. Never 2. _____Weeks 3. _____ Months	/____/
59) At his/her birth, after how long did breast-feed your child for the first time?	1. 1 to 4 hours 2. 5 hours and more…	/____/
60) How long did you breastfeed? Give Number of weeks/months	1. In progress 2. _____Months	
61) At what age did you start complementary feeding?		
62) Your child was he sick the last 2 weeks?	1.Yes 2. No	
63) Which were the first 5 foods introduced to the diet of this child (indicate ingredients)	a) _____ b) _____ c)_____ d)_____ e) _____	

APPENDIX 2: QUESTIONNAIRE (French)

<u>THEME:</u> An investigation of social-cultural practices, the presence of the double burden of malnutrition, and mothers' and their children's eating patterns in Benin

Département : ……...

Commune : ……

Arrondissement : ……

Village : ……..……

Secteur : (Urban 1 Rural 2) ……

QUESTION		CODE
Date d'interview (dd mm yy)	/___//___//___/	
ID Ménage		
IDENTITE DE L'INTERVIEWER		
ID interviewer		
SECTION A : INFORMATIONS SUR LE MENAGE		
1) Qui est le chef du ménage		
2) Code de la mère		
3) Age de la mère (mois)		
4) Numéro de téléphone		
5) Nom de l'enfant		
6) Date de naissance de l'enfant	/___/ /___//___/ (dd/mm/yy)	
7) Age de l'enfant (mois)		/____/
8) Sexe de l'enfant	1. Masculin 2. Féminin	/____/
9) Poids de naissance de l'enfant		
SECTION B : ANTHROPOMETRIE		
10) Poids de la mere	1).....kg 2)…..... kg Moyenne.……..….kg	
11) Taille de la mère	1) .....cm 2).....cm Moyenne ……....cm	
12) Tour de taille de la mère	1) .....cm 2) .....cm Moyenne …….cm	
13) Poids de l'enfant	1) .....kg 2) ..... kg Moyenne …. ……kg	

14) Taille de l'enfant	1) .....cm 2) .....cm Moyenne ……...cm	
15) Longueur de l'enfant (pour les enfants de 0 à 2 ans)	1) .....cm 2) .....cm Moyenne …… cm	
SECTION C : STATUS SOCIO-ECONOMIQUE		
16) Quel est le type de votre mariage	0. Monogamie 1. Polygamie	____\
17) Combien d'enfants avez-vous ?		____\
18) Combien d'enfants de moins de 5 ans avez-vous?		____\
19) Nombre de personnes vivant habituellement dans le menage	_____Nombres d'adultes (≥ 18 y) _____Nombre de jeunes (12 ≤ years < 18) _____Nombre d'enfants (< 12 y)	
20) Quel est votre statut matrimonial ?	1. Célibataire 2. Mariée/ concubine 3. Séparée 4. Divorcée 5. Veuve 66. Autres (précisez) : _____	____\
21) Quel est le niveau de scolarisation de la mère	1. Aucun 2. Seulement alphabétisée 3. Ecole primaire 4. Collège 5. Université	____\
22) Quelle est votre principale activité ?	1. Ménagère 2. Agent de l'Etat 3. Agent secteur prive 4. Police ou militaire 5. Commerçante 6. Agricultrice 7. Ouvrière agricole	____\

	8. Artisane 66. Autres : _____	
23) Quel est la principale activité du père de famille	1. Agent de l'Etat 2. Agent secteur prive 3. Police ou militaire 4. Commerçant ou entrepreneur 5. Agriculteur 6. Ouvrier agricole 7. Pécheur 8. Artisan 66. Autres : _____	____\
24) Quel est votre principale source de revenue	1. Salaire (emploi permanent) 2. Salaire (journalier ou temporaire) 3. Vente 4. Aide, assistance 5. Mari 66. Autres (précisez) _____	____\
25) Quel est la principale source de revenue de votre conjoint ?	1. Salaire (emploi permanent) 2. Salaire (journalier ou temporaire) 3. Vente 4. Aide, assistance 5. Femme 66. Autres (précisez) _____	____\
26) Quel est le revenu moyen de votre ménage ?	1. < Fcfa 30 000 (US$ 60) 2. Fcfa 30 000-100 000 (US$ 60- US$ 100) 3. > Fcfa 100 000 and more (US$ 100)	____\
27) Qui décide de la somme à utiliser pour l'alimentation dans le ménage ?	1. Vous-même 2. Mère/belle mère 3. Mari/Partenaire 4. Père/ beau-père 5. Autres (spécifiez): _____	____\

28) Quel est en moyenne la dépense alimentaire par mois du ménage ?		
29) Avez-vous ces articles dans votre maison ?	1. Oui 2. Non	
29.1) Radio/Tape		
29.2) Télévision		
29.3) Phone/Hand phone Portable		
29.4) Réfrigérateur		
29.5) Ordinateur		
29.6) Bicyclette		
29.7) Moto		
29.8) Voiture		
29.9) Taxi		
30.1) avez-vous dans votre ménage un élevage domestique (volaille, mouton…) ?	1. Oui 2. Non	
30.2) Si Oui, lequel (s) ?		
31) Dans votre ménage, avez-vous ?		
31.1) Une terre cultivable ?		
31.2) Une terre cultivable en location ?		
32) Combien de pièces avez-vous dans la maison la douche exclue ?		
33) Quel est votre statut dans la maison que vous occupez ?	1. Propriétaire 2. Maison familiale 3. Locataire 4. Logement gratuit 5.Logements du personnel 66. Autres : _____	____\

34) Enregistrer le matériau du sol de la maison (l'enquêteur le fait lui-même)	1.Terre, sable, pierre 2. Ciment 3. Carreaux, marbre, céramique 66. Autre (précisez)_____	____\
35) Enregistrer le matériau du mur de la maison (l'enquêteur le fait lui-même)	1. Branche de palme, carton, toile cirée 2. Bois, bambou 3. Tôle 4. Argile, terre 5. Brique, Ciment 66. Autres ; _____	____\
36) Enregistrer le matériau du toit de la maison (l'enquêteur le fait lui-même)	1. Paille 2. Tôle 3. Béton 4. Tuile 66. Autres (précisez): _____	____\
37) Quel est votre principale source d'éclairage ?	1. Electricité 2. Pétrole 3. Groupe électrogène 4. Panneaux solaires 66. Autres (précisez): _____	____\
38) Avez-vous une source additionnelle d'éclairage ?	1. Electricité 2. Pétrole 3. Groupe électrogène 4. Panneaux solaires 66. Autres (précisez): _____	____\
39) Dans votre ménage, quelle est la principale source d'énergie que vous utilisez pour la cuisine	1. Bois de chauffe 2. Charbon de bois 3. Pétrole 4. Gaz 5. Électricité 66. Autres : _____	____\

40) Quelle est la principale source d'approvisionnement en eau de boisson de votre ménage ?	1. Eau en bouteille 2. Eau courante (robinet) 3. Forage équipé de pompe manuelle (Fontaine publique 4. Eau de puit 5. Eau de surface (rivière, lac) 6. Eau de citerne 7. Eau de pluie 66. Autres : _____	____\
41) Quel type de toilette utilisez-vous ?	1. WC moderne (chasse d'eau) 2. Fosse 3. Pas de toilettes 66. Autres : _____	____\
SECTION D : EATING PATTERNS		
42) Est-ce que vous fumez ?	1. Oui 2. Non	____\
43) Buvez-vous de l'alcool (spiritueux, bière, vin)	1. Oui 2. Non	____\
44) Combien de fois préparez-vous a mangé dans le ménage ?	1. Deux ou plus par jour 2. Une fois par jour 66. Autres : _____	____\
45) Combien de repas prenez-vous par jour ?	1. Cinq 2. Quatre 3. Trois 4. Deux 5. Une fois	____\
46) A quelle heure, mangez-vous habituellement ? (Plusieurs réponses sont possibles)	1. Petit déjeuner 2. Déjeuner 3. Diner 4. Gouter du soir	____\
47) Qui décide de l'achat de la nourriture ?	1. Vous-même 2. Mari 66. Autres :	____\

48) A quelle fréquence vous approvisionnez-vous ?	1. Chaque jour 2. 3 à 5 fois par semaine 3. Moins de 2 fois par semaine 4. Toute les quinzaines de jours 5. Une fois par mois	____\
49.1) Avez-vous un jardin à la maison ?	1. Oui 2. Non	____\
49.2) Si oui, que produisez-vous ? Which vegetables do you grow?		
50) Qui est charge de la préparation des repas ?	1. vous-même 2. Domestique 3. Autres : _____	____\
51) Mangez-vous à l'extérieur de la maison ?	1. Oui 2. Non	____\
52) Ou mangez-le-vous plus souvent quand vous mangez dehors ? (Plusieurs réponses sont possibles)	1. Restaurant 2. Maquis/ Cafeteria 3. Rue 4. Cantine au travail 66. Autres : _____	____\
53) Pour quelle (s) raison (s) vous mangez dehors ? (Plusieurs réponses sont possibles)	1. Travail loin de la maison 2. Rien à manger à la maison 3. Pas envie de manger repas préparé à la maison 4. Autres (spécifiez): _____	____\
54) A quelle fréquence consommez-vous les aliments frits ??	1. Chaque jour 2. Trois fois et plus par semaine 3. Au moins une fois par semaine 4. Chaque mois 5. Rarement	____\
55.1) Avez-vous reçu des informations sur l'alimentation ?	1. Oui 2. Non	____\

55.2) Si oui, par quels moyens ? (Plusieurs réponses sont possibles)	1. Radio 2. Télévision 3. Journaux, revues 4. Livres 5. Des professionnels de la santé (médecins, diététiciens, nutritionnistes, infirmières, etc.) 66. Autres : _____	____\
55.3) Si non, aimeriez-vous recevoir des informations sur l'alimentation ?	1. Oui 2. Non	____\
55.4) Si oui par quels moyens ? (Plusieurs réponses sont possibles)	1. Radio 2. Télévision 3. Journaux, revues 4. Livres 5. Des professionnels de la santé (médecins, diététiciens, nutritionnistes, infirmières, etc.) 66. Autres : _: _____	____\
56.1) Avez-vous de l'intolérance par rapport à certains aliments ?	1. Oui 2. Non	____\
56.2) Si Oui, précisez		
57) Do you ever take supplements?		

SECTION D: ALLAITEMENT ET ALIMENTATION DE COMPLEMENT		
58.1) Avez-vous allaité votre enfant ?	1. Oui 2. Non	
58.2) Si Oui, Durant combine de temps avez-vous pratique l'allaitement maternel exclusif (lait maternel sans rien même de l'eau)	1. Jamais 2. _____Semaine 3. _____ Mois	
59) A la naissance, combien de temps après lui avez-vous donné le sein ?	1. 1 à 4 heures après 2. 5 heures et plus….	

60) Pendant combien de temps avez-vous allaité ? Donnez le nombre de semaines ou de mois	1. En cours 2. _____Mois	
61) A quel âge avez-vous débuter l'alimentation de complément pour votre enfant ?		
62) Votre enfant a t'il été malade ces deux dernières semaines ?	1. OUI 0. NON	
63) Quels sont les cinq premiers aliments que vous avez introduits dans l'alimentation de votre enfant ?	a) _____ b) _____ c)_____ d)_____ e) _____	

APPENDIX 3: FOOD FREQUENCY QUESTIONNAIRE (English)

Thank you for accepting the invitation to participate in this study. We want to know what child and his mother eat.

This information is important to know as it will tell us if people are eating enough and if they are healthy.
Tick the right answer and puts the value for meal size.

Answer each question as best you can. Estimate if you are not sure. Don't leave a blank

Please think carefully about the food and drink you have consumed during the past months. I will go through a list of foods and drinks with you and I would like you to tell me:

If you eat the food
How much of the food you eat at a time?
How many times a day/a week/a month you eat it or if you don't eat it every day?
Please remember that there are no right or wrong answers. Everything you tell me is confidential.
Is there anything you want to ask now?
Are you willing to go on with the questions?

SECTION A: FOR MOTHER

64.1) Did you take porridge today? /____/1. Yes /____/ 2. No

64.2) If Yes, which one? _____

64.3) Do you add sugar? /____/ 1. Yes /____/ 2. No

64.4) How much? /____/ 1. 1 or 2 teaspoons /____/ 2. 3 and more… teaspoons

Food items Description	**Never**	**Daily (more than 4/week)**	**weekly (1 or 2 times/week)**	**Seasonally**	**Occasionally**	**Monthly (1 or 2 times/month)**
Cereals						
65.1) Loaf bread						
65.2) Slices bread						
65.3) Do you spread your bread with something? /____/ 1. Yes /____/ 2. No						
65.4) With? _____						
66.1) Pasta (macaroni, spaghetti)						
66.2) With tomato sauce						
66.3) Without tomato sauce (all ingredients without tomato)						
67.1) Maize Boiled						
67.2) Maize grilled						
67.3) Maize-based fermented dough (Akassa)						
67.4) Cooked maize paste (Owo)						
67.5) How do you eat it? (sauce): _____						
67.6) Maize fritters (Klèklè)						

67.7) Fermented maize-based gruel (made from mawè) (Aklui)						
67.8) Fermented maize-based gruel (Gbangba)						
68) Sorghum porridge						
69) Ablo						
70.1) Rice cooked						
70.2) Rice boiled with beans						
70.3) Rice red						
71) Couscous						

72) Which oil or fat do you use for cooking?
1. Margarine/Butter/__/ 2. Palm oil /__/ 3. Peanut oil /__/ 4. Processed oil/__/ 5. Sheabutter /__/

Food items Description	**Never**	**Daily (more than 4/week)**	**weekly (1 or 2 times/week)**	**Seasonally**	**Occasionally**	**Monthly (1 or 2 times/month)**
FAT						
73) Margarine/Butter						
74) Mayonnaise						
75) Palm oil						
76) Peanut oil						
77) Processed oil						
78) Sheabutter						
VEGETABLES						
79) Tomato						
80) Onion						
81) Carrot						
82) Cabbage						
83) Cucumber						
84) Green bean						

85) Okra (Févi)						
86) Wild basil (Tchiayo)						
87) Bitter leaf (Amanvivé)						
88) Red amaranth (Fotètè)						
89) Cocks comb (Soman)						
90) African eggplant (Gboman)						
91) Cassava leaves (Fingninman)						
92) Black plum (Fonman)						
93) Jute (Ninnouwi)						
94) Launeae taraxacifolia (Gnantoto)						
95) Cowpea leaves						
96.1) Do you do consume salad? /____/1. Yes /____/ 2. No No If No skip question 99						
96.2) Lettuce						
96.3) Choose the ingredients used: /__/1. Raw tomato /__/2. Raw onion /__/3. Cucumber 66. 0thers:_____						
Starchy roots, tubers						
97) Potatoes						
98.1) Yam boiled						
98.2) Yam (pounded, amala, wassa-wassa)						
98.3) Yam paste (amala)						
98.4) Yam couscous (wassa-wassa)						
98.5) Yam stew						
99.1) Cassava paste						
99.2) Gari						

99.3) Gari paste						
99.4) Cassava boiled						
99.5) Tapioca						
100.1) Sweet potato boiled						
100.2) Sweet potato fried						
Legumes and nuts						
101.1) Peanut Boiled						
101.2) Peanut Roasted						
101.3) Peanut fritter						
102) Beans						
103.1) Soya (porridge)						
103.2) Soya cheese						
104) Red palm nut soup (Denoussounou)						
Fruits						
105) Where do you get your fruits from? (There can be more than one answer) /__/1. Own fruit trees /__/2. Employer's farm /__/3. Own farm /__/4. Market /__/5. Gift /__/66. Other (specify)						
106) Pineapple						
107) Avocado						
108) Sweet Banana						
109) Sugar cane						
110) Lemon						
111) Guava						
112) Mandarin						
113) Mango						
114) Coconut water						
115) Coconut						
116) Orange						
117) Grapefruit						
118) Papaya						
119) Watermelon						

120) Breadfruit						
121) Apple fruit						
122.1) Bananas plantain raw						
122.2) Bananas plantain fried						
Eggs, Fish and Meat						
123) Where do you get your chicken/egg/meat from (may answer more than one)? /__/1. Market /__/2. Slaughter own /__/3. Gift /__/4. Do not eat chicken /__/5. Other (specify):						
124) Eggs (poultry)						
125.1) Fresh fish						
125.2) Dry fish						
125.3) Fried fish						
125.4) Smoked fish						
125.5) Sardines						
126) Chicken						
127) Beef						
128) Mutton/Lamb						
129) Guinea fowl						
130) Pork						
131) Snail						
Beverages						
132) Fruit juice						
133) Soft drink (Coca, fanta,)						
134) Traditional drink sweated (Tchakpalo)						
135) Akpan made from maize						
136) Traditional alcohol (sodabi)						
137) Beer						
138) Wine						

Milk and products						
139) Dried milk						
140) Yoghurt						
141) Milk concentrated						
142) Cheese						
Others						
143) Honey						
144) Chips						
145) Cakes						
146) Chocolate, candy						
147) Wheat fritter (Yovodoko)						
148) pepper (chilli)						

SECTION B: FOR CHILD

149.1) Did you give to your child porridge today? /____/ 1. Yes /____/ 2. No

149.2) If yes, what porridge?

_____

149.3) How many times does he/she drink it per day?

_____

149.4) Do you add sugar? /____/ 1. Yes /____/ 2. No

149.5) How much? /____/ 1. 1 or 2 tablespoons /____/ 2. 3 and more… tablespoons

Food items Description	**Never**	**Daily (more than 4/week)**	**weekly (1 or 2 times/week)**	**Seasonally**	**Occasionally**	**Monthly (1 or 2 times/month)**
Cereals						
150.1) Loaf bread						
150.2) Slices bread						
150.3) Do you spread his/her bread with something? /____/ 1. Yes /____/ 2. No						
150.4) With? _____						
151.1) Pasta (macaroni, spaghetti)						
151.2) With tomato sauce						
151.3) Without tomato sauce (all ingredients without tomato)						
152.1) Maize Boiled						
152.2) Maize grilled						
152.3) Maize-based fermented dough (Akassa)						
152.4) Cooked maize paste (Owo)						

152.5) How does he/she eat it? (sauce): _____						
152.6) Maize fritters (Klèklè)						
152.7) Fermented maize-based gruel (made from mawè) (Aklui)						
152.8) Fermented maize-based gruel (Gbangba)						
153) Sorghum porridge						
154) Ablo						
155.1) Rice cooked						
155.2) Rice boiled with beans						
155.3) Rice red						
156) Couscous						
FAT						
157) Margarine/Butter						
158) Mayonnaise						
159) Palm oil						
160) Peanut oil						
161) Processed oil						
162) Sheabutter						
VEGETABLES						
163) Tomato						
164) Onion						
165) Carrot						
166) Cabbage						
167) Cucumber						
168) Green bean						
169) Okra (Févi)						

170) Wild basil (Tchiayo)						
171) Bitter leaf (Amanvivé)						
172) Red amaranth (Fotètè)						
173) Cocks comb (Soman)						
174) African eggplant (Gboman)						
175) Cassava leaves (Fingninman)						
176) Black plum (Fonman)						
177) Jute (Ninnouwi)						
178) Launeae taraxacifolia (Gnantoto)						
179) Cowpea leaves						
180.1) Does he/she consume salad? /____/1. Yes /____/ 2. No No If No skip question 184						
180.2) Lettuce						
180.3) Choose the ingredients used: /__/1. Raw tomato /__/2. Raw onion /__/3. Cucumber 66. 0thers:_____						
Starchy roots, tubers						
181) Potatoes						
182.1) Yam boiled						
182.2) Yam pounded						
182.3) Yam paste (amala)						
182.4) Yam couscous (wassa-wassa)						
182.5) Yam stew						
183.1) Cassava paste						
183.2) Gari						
183.3) Gari paste						

183.4) Cassava boiled						
183.5) Tapioca						
184.1) Sweet potato boiled						
184.2) Sweet potato fried						
Legumes and nuts						
185.1) Peanut Boiled						
185.2) Peanut Roasted						
185.3) Peanut fritter						
186) Beans						
187.1) Soya (porridge)						
187.2) Soya cheese						
188) Red palm nut soup (Denoussounou)						
Fruits						
189) Pineapple						
190) Avocado						
191) Sweet Banana						
192) Sugar cane						
193) Lemon						
194) Guava						
195) Mandarin						
196) Mango						
197) Coconut water						
198) Coconut						
199) Orange						
200) Grapefruit						
201) Papaya						
202) Watermelon						
203) Breadfruit						
204) Apple fruit						
205.1) Bananas plantain raw						

205.2) Bananas plantain fried						
Eggs, Fish and Meat						
206) Eggs (poultry)						
207.1) Fresh fish						
207.2) Dry fish						
207.3) Fried fish						
207.4) Smoked fish						
207.5) Sardines						
208) Chicken						
209) Beef						
210) Mutton/Lamb						
211) Guinea fowl						
212) Pork						
213) Snail						
Beverages						
214) Fruit juice						
215) Soft drink (Coca, fanta,)						
216) Traditional drink sweated (Tchakpalo)						
217) Akpan made from maize						
Milk and products						
218) Dried milk						
219) Yoghurt						
220) Milk concentrated						
221) Cheese						
Others						
222) Honey						
223) Chips						
224) Cakes						

225) Chocolate, candy						
226) Wheat fritter (Yovodoko)						
227) pepper (chilli)						

APPENDIX 4 : FOOD FREQUENCY QUESTIONNAIRE POUR LA MERE ET L'ENFANT (French)

Merci d'avoir accepté l'invitation à participer à cette étude. Nous voulons savoir ce que votre enfant et vous mangez.

Cette information est importante à connaître car il nous dira si votre alimentation est saine et si vous êtes en sont en bonne santé. Cochez la bonne réponse dans les cases. Répondez à chaque question du mieux que vous pouvez. Estimer si vous n'êtes pas sûr.

S'il vous plaît pensez aux aliments et boissons que vous avez consommez au cours des derniers mois. Je vais vous citer une liste d'aliments et de boissons et vous me direz :

Si vous l'avez consommé ou pas et a quelle fréquence.

Combien de fois par jour / semaine / mois vous mangez cet aliment ou si vous ne mangez pas tous les jours ?

S'il vous plaît rappelez-vous qu'il n'y a pas de bonnes ou mauvaises réponses. Tout ce que vous me dites est important et restera confidentiel.

Est-ce que vous avez des questions à poser ?

Êtes-vous prêt pour commencer ?

SECTION A : POUR LA MERE

64.1) Avez-vous bu de la bouillie aujourd'hui ? /____/1. Oui /____/ 2. Non

64.2) Si Oui, laquelle ? _____

64.3) Avez-vous ajoutez du sucre ? /____/1. Oui /____/ 2. Non

64.4) Quelle quantité ? /____/ 1. 1 or 2 cuillères /____/ 2. 3 cuillères et plus…

ALIMENTS	**Jamais**	**Tous les jours (plus de 4 fois/semaine)**	**Par semaine (1ou 2 fois/semaine)**	**Saisonnier**	**Occasionnellement**	**Par mois (1 ou 2 fois/mois)**
Céréales						
65.1) Pain salé						
65.2) Pain en tranches						
65.3) Mangez-vous le pain avec quelque chose ? /____/1. Oui /____/ 2. Non						
65.4) Avec ? _____						
66.1) Pasta (macaroni, spaghetti)						
66.2) avec sauce tomate						
66.3) Sans sauce tomate (autres ingrédients sans tomate)						
67.1) Maïs bouillie						
67.2) Maïs grillé						
67.3) Pate de maïs fermentée (Akassa)						
67.4) Pate de maïs (Owo)						
67.5) Avec quoi le mangez-vous ? (Sauce): _____						
67.6) Galette de maïs (Klèklè)						
67.7) Bouillie de maïs (Aklui)						

67.8) Bouillie de maïs (Gbangba)						
68) Bouillie de Sorgho						
69) Gâteau de riz ou de maïs Ablo						
70.1) Riz bouillie						
70.2) Riz avec haricot (atassi)						
70.3) Riz au gras						
71) Couscous						

72) Quelle huile utilisez-vous pour cuisine ?

/__/1. Margarine/Beurre /__/2. Huile de palme /__/3.Huile d'arachide

/__/ 4. Huile industrielle /__/5. Beurre de karité

ALIMENTS	**Jamais**	**Tous les jours (plus de 4 fois/semaine)**	**Par semaine (1ou 2 fois/semaine)**	**Saisonnier**	**Occasionnellement**	**Par mois (1 ou 2 fois/mois)**
Gras						
73) Margarine/Beurre						
74) Mayonnaise						
75) Huile de palme						
76) Huile d'arachide						
77) Huile industrielle						
78) Beurre de karité						
LEGUMES						
79) Tomate						
80) Oignon						
81) Carotte						
82) Chou						
83) Concombre						
84) Haricot vert						
85) Gombo (Févi)						

86) Ocimum gratissimum (Tchiayo)						
87) Vernonia (Amanvivé)						
88) Amarante (Fotètè)						
89) Cocks comb (Soman)						
90) Grande morelle (Gboman)						
91) Feuilles de manioc (Fingninman)						
92) Black plum (Fonman)						
93) Jute (Ninnouwi)						
94) Launeae taraxacifolia (Gnantoto)						
95) Feuilles de niébé						
96.1) Mangez-vous de la salade ? /____/1. Oui /____/ 2. Non Si non, allez à la question 97						
96.2) Laitue						
96.3) Choisissez les ingrédients utilisés : /__/1. Tomate /__/2. Oignon /__/3. Concombre 66. Autres : _____						
Tubercules						
97) Pomme de terre						
98.1) Igname bouillie						
98.2) Igname pilé						
98.3) Pâte d'Igname (amala)						
98.4) Couscous d'Igname (wassa-wassa)						
98.5) Ragout d'Igname						
99.1) Pâte de manioc						
99.2) Gari						
99.3) Pâte de Gari (Eba)						

99.4) Manioc bouilli						
99.5) Tapioca						
100.1) Patate douce bouillie						
100.2) Patate douce frite						
Légumineuses et noix						
101.1) Arachide bouillie						
101.2) Arachide grillée						
101.3) Beignet d'arachide						
102) Niébé						
103.1) Soja (Bouillie)						
103.2) Fromage de Soja						
104) Sauce de noix de palme (Denoussounou)						
Fruits						
105) Ou vous approvisionnez vous en fruits ? (Plus d'une réponse est possible) /__/1.arbre fruit /__/2. Ferme de l'employeur /__/3.Propre fruit /__/4. Marché /__/5. Don /__/66. Autres (Précisez):						
106) Ananas						
107) Avocat						
108) Banane douce						
109) Canne à sucre						
110) Citron						
111) Goyave						
112) Mandarine						
113) Mangue						
114) Eau de coco						
115) Coco						
116) Orange						
117) Pamplemousse						
118) Papaye						
119) Pastèque						

120) Fruit de l'arbre à pain						
121) Pomme fruit						
122.1) Banane plantain						
122.2) Banane plantain frit						
Œufs, Poisson, Viande						
123) Ou procurez-vous les œufs/poisson/viande ? (Plusieurs réponses sont possibles) /__/1. Marché /__/2. Propre élevage /__/3. Don /__/4. Ne mange pas /__/5.Autres (précisez):						
124) Œufs						
125.1) Poisson frais						
125.2) Poisson séché						
125.3) Poisson frit						
125.4) Poisson fumée						
125.5) Sardines						
126) Poulet						
127) Viande de bœuf						
128) Viande de mouton						
129) Viande de canard						
130) Viande de porc						
131) Escargot						
Boisson						
132) Jus de fruit						
133) Coca, Fanta,						
134) Boisson traditionnelle (Tchakpalo)						
135) Akpan						
136) Alcool traditionnelle (sodabi)						
137) Bière						
138) Vin						

Lait et produits laitiers						
139) Lait en poudre						
140) Yaourt						
141) Lait concentrée						
142) Fromage de lait						
Autres						
143) Miel						
144) Chips						
145) Gâteaux						
146) Chocolat, bonbons						
147) Gâteau de blé (Yovodoko)						
148) Piment						

SECTION B : POUR L'ENFANT

149.1) Avez-vous donné de la bouillie a votre enfant aujourd'hui ? /____/1. Oui /____/ 2. Non

149.2) Si Oui, quelle bouillie ?

_____

149.3) Combien de fois par jours le prend t'il ?

_____

149.4) Avez-vous ajoutez du sucre ? /____/1. Oui /____/ 2. Non

149.5) Quelle quantité ? /____/ 1. 1 or 2 cuillères à café /____/ 2. 3 cuillères à café et plus…

ALIMENTS	**Jamais**	**Tous les jours (plus de 4 fois/semaine)**	**Par semaine (1ou 2 fois/semaine)**	**Saisonnier**	**Occasionnellement**	**Par mois (1 ou 2 fois/mois)**
Céréales						
150.1) Pain salé						
150.2) Pain en tranches						
150.3) Mange t'il le pain avec quelque chose ? /____/1. Oui /____/ 2. Non						
150.4) Avec ? _____						
151.1) Pasta (macaroni, spaghetti)						
151.2) avec sauce tomate						
151.3) Sans sauce tomate (autres ingrédients sans tomate))						
152.1) Maïs bouillie						
152.2) Maïs grillé						
152.3) Pate de maïs fermentée (Akassa)						

152.4) Pate de maïs (Owo)						
152.5) Avec quoi le mangez-vous ? (Sauce): _____						
152.6) Galette de maïs (Klèklè)						
152.7) Bouillie de maïs (Aklui)						
152.8) Bouillie de maïs (Gbangba)						
153) Bouillie de Sorgho						
154) Gâteau de riz ou de maïs Ablo						
155.1) Riz bouillie						
155.2) Riz avec haricot (atassi)						
155.3) Riz au gras						
156) Couscous						
Gras						
157) Margarine/Beurre						
158) Mayonnaise						
159) Huile de palme						
160) Huile d'arachide						
161) Huile industrielle						
162) Beurre de karité						
LEGUMES						
163) Tomate						
164) Oignon						
165) Carotte						
166) Chou						
167) Concombre						
168) Haricot vert						
169) Gombo (Févi)						

170) Ocimum gratissimum (Tchiayo))						
171) Vernonia (Amanvivé)						
172) Amarante (Fotètè)						
173) Cocks comb (Soman)						
174) Grande morelle (Gboman)						
175) Feuilles de manioc (Fingninman)						
176) Black plum (Fonman)						
177) Jute (Ninnouwi)						
178) Launeae taraxacifolia (Gnantoto)						
179) Feuilles de niébé						
180.1) Mange-t-il de la salade ? /____/1. Oui /____/ 2. Non Si non, allez à la question 181						
180.2) Laitue						
180.3) Choisissez les ingrédients utilisés : /__/1. Tomate /__/2. Oignon /__/3. Concombre 66. Autres : ___						
Tubercules						
181) Pomme de terre						
182.1) Igname bouillie						
182.2) Igname bouillie						
182.3) Pâte d'Igname (amala))						
182.4) Couscous d'Igname (wassa-wassa)						
182.5) Ragout d'Igname						
183.1) Pâte de manioc						
183.2) Gari						
183.3) Pâte de Gari (Eba)						

183.4) Manioc bouilli						
183.5) Tapioca						
184.1) Patate douce bouillie						
184.2) Patate douce frite						
Légumineuses et noix						
185.1) Arachide bouillie						
185.2) Arachide grillée						
185.3) Beignet d'arachide						
186) Niébé						
187.1) Soja (Bouillie)						
187.2) Fromage de Soja						
188) Sauce de noix de palme (Denoussounou)						
Fruits						
189) Ananas						
190) Avocat						
191) Banane douce						
192) Canne à sucre						
193) Citron						
194) Goyave						
195) Mandarine						
196) Mangue						
197) Eau de coco						
198) Coco						
199) Orange						
200) Grapefruit						
201) Papaye						
202) Pastèque						
203) Fruit de l'arbre à pain						

204) Apple fruit						
205.1) Banane plantain						
205.2) Banane plantain frit						
Œufs, Poisson, Viande						
206) Œufs						
207.1) Poisson frais						
207.2) Poisson séché						
207.3) Poisson frit						
207.4) Poisson fumée						
207.5) Sardines						
208) Poulet						
209) Viande de bœuf						
210) Viande de mouton						
211) Viande de canard						
212) Viande de porc						
213) Escargot						
Boisson						
214) Fruit juice						
215) Coca, fanta,						
216) Boisson traditionnelle (Tchakpalo)						
217) Akpan						
Lait et produits laitiers						
218) Lait en poudre						
219) Yaourt						
220) Lait concentrée						
221) Fromage de lait						
Autres						
222) Miel						
223) Chips						
224) Gâteaux						

225) Chocolat, bonbons						
226) Gâteau de blé (Yovodoko)						
227) Piment						

APPENDIX 5: Focus group schedule (English)

I would to thank you all for coming to this focus group discussion. My Name is_____ and I will facilitate the discussion. I am doing a research at University of Stellenbosch. I would discuss with you about foods habits, beliefs and taboos and care practices in children living in Grand Popo. We can use information collected to contribute to more effective nutrition programmes running in your communities and throughout Benin.

The discussion is about on foods habits, beliefs and taboos that you have in your communities and care practices in relation to children. So please, do not feel shy during discussions and feel free to bring up all aspects may you be thinking of. All views, experiences and opinions are valuable to this research. There are no right or wrong answers to-any sections.

Your participation in this group discussion is completely voluntary. If you are no agree to be part of this group, you are free to leave at any moment. However, we value and appreciate your views and hope you will stay and share your thoughts. The information collected today is confidential. It will be used only for research purposes. All information collected will be securely, stored and only accessible by the researcher.

During the discussion, we will take notes and we would like to tape record the discussion. Don't be worried about it as the recording will remain completely confidential.

It is also important that we try to let only one person talk at a time so that we do not miss anything. Feel free to disagree with others and share your own opinions and talk if you have something to say.

The meeting will run for a total time of one hour. Does anyone have any questions before we start?

Discussion guide

1- What do you think is a healthy diet?

2- About breastfeeding?

3- Practices exclusive breastfeeding?

4- Food usually give to a child in a day

5- Foods that you think necessary for child growth

6- During the first year, feeding practices

7- Care practices and feeding during illness

8- Food distribution in your household (who is serve the first,

9- Understanding about foods taboos

10- Foods taboos, restrictions during pregnancy and breastfeeding (women)

11- Foods you eat especially during pregnancy and lactation for your good health or for your child's.

12- Foods young children cannot eat

13- Foods not eat during illness

We are at the end of the focus group discussion. Does anyone have any questions? Thank you all very much for your time and opinions. Once again, the information file managed today is completely call confidential and will only be used for research Purposes

APPENDIX 6 : Focus groupe guide (French)

Date : _____

Time : _____

Village : _____

Facilitateur : _____

Je voudrais vous remercier tous d'être venus à cette réunion. Mon nom est _____ et je vais diriger cette discussion. Je suis en train de faire une recherche à l'Université de Stellenbosch. Je voudrais discuter avec vous au sujet des habitudes alimentaires, des croyances, des tabous alimentaires et des pratiques de soin aux enfants dans vos communautés à Grand Popo. Les informations recueillies pourront être utile pour contribuer à améliorer l'efficacité des programmes de nutrition en cours d'exécution dans vos communautés et dans tout le Bénin.

Nous aimerions avoir une discussion libre sur vos habitudes, les croyances et les tabous alimentaires que vous avez dans votre communauté et les soins pratiqués aux enfants. Alors s'il vous plaît, ne vous sentez pas timide au cours des discussions et soyez libre de vous exprimer. Toutes opinions, expériences et opinions sont précieuses pour cette recherche. Il n'y a pas de bonne ou mauvaise réponse pour ces questions.

Votre participation à ce groupe de discussion est entièrement volontaire. Si vous n'êtes plus d'accord pour faire partie de ce groupe, vous êtes libre de partir à tout moment. Cependant, nous apprécierons vos opinions et nous espérons que vous allez rester et partager vos pensées avec nous. Les informations que vous allez partager aujourd'hui seront confidentielles. Elles seront utilisées uniquement à des fins de recherche. Toutes les informations recueillies seront sauvegardées et accessible uniquement par le chercheur.

Au cours de la discussion, nous allons prendre des notes et nous aimerions aussi enregistrer la discussion. Ne soyez pas inquiet à ce sujet car l'enregistrement restera entièrement confidentiel. Il est également important que nous de laissons une seule personne parlé à la fois afin que rien ne nous échappe. Sentez-vous libre durant la discussion d'être en désaccord avec les autres et partager vos propres opinions. Parlez si vous avez quelque chose à dire.

La réunion se déroulera pendant une durée totale d'une heure. S'il vous plait, quelqu'un aurait t'il des questions avant qu'on ne commence ?

Guide de discussion

1- Ce que vous pensez à propos d'une alimentation saine

2- Ce que pensez à propos de l'allaitement maternel

3- Pratiques de l'allaitement maternel exclusive

4- Aliments habituels donnés à l'enfant en journée

5- Aliments nécessaires à la croissance des enfants

6- Durant la première année, alimentation de l'enfant

7- Pratiques de soins et alimentation durant la maladie

8- Distribution de la nourriture dans le ménage (comment le partage est fait)

9- Compréhension, connaissances sur les interdits alimentaires

10- Interdits, restrictions alimentaires durant la grossesse et l'allaitement pour la femme

11- Aliments consommés en particulier durant la grossesse ou la période d'allaitement pour la bonne santé de la mère ou de l'enfant

12- Aliments interdits aux enfants

13- Aliments non consommés durant la maladie.

Nous sommes à la fin de notre discussion. Auriez -vous des questions ?

Je vous remercie tous pour votre temps et votre participation. Encore une fois, l'information recueillie sera confidentielle et ne sera utilisée à qu'à des fins de recherche.

APPENDIX 7: PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

(English and French)

TITLE OF THE RESEARCH PROJECT:

AN INVESTIGATION OF SOCIAL-CULTURAL PRACTICES, THE PRESENCE OF THE DOUBLE BURDEN OF MALNUTRITION, AND MOTHERS' AND THEIR CHILDREN'S EATING PATTERNS IN BENIN

REFERENCE NUMBER:

PRINCIPAL INVESTIGATOR: Miss Yrence AMOUSSOU LOKOSSOU

ADDRESS:

CONTACT NUMBER:

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.
This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

Vous êtes invite à prendre part à un projet de recherche. S'il vous plait, je vous prie de prendre un moment pour lire les informations présentes ici qui expliquent en détail l'étude. Veuillez poser toutes les questions aux personnes du projet si vous avez besoin d'explications. Il est vraiment important que vous compreniez le but de cette recherche et que vous sachez ce que vous aurez à faire. Aussi, votre participation est entièrement volontaire et vous êtes libres de vous retirer. Si vous dites non aucune charge ne sera retenue contre vous. Vous êtes aussi libre de vous retirer a n'importe quel moment de l'étude même si vous aviez donne votre accord.

Cette étude a été approuvée par le comité d'éthiques de la recherche en santé de l'université de Stellenbosch et sera conduite en accord avec les règles et principes d'éthiques de la déclaration internationale d'Helsinki, les règles sud-africaines pour de bonnes pratiques cliniques et les règles du conseil d'éthique en recherche médical

What is this research study all about?

- *Where will the study be conducted; are there other sites; total number of participants to be recruited at your site and altogether.*

The study will be conducted in Benin in the southern of Benin in the town of Grand Popo among children between 0 to 5 years and their mothers. The sample of 400 couples mother-child will be randomly selected with an equal chance of being chosen.

L'étude se déroulera au sud du Benin dans la commune de Grand Popo sur les enfants de 0 à 5 ans et leurs mères. L'échantillon de 350 couples mère-enfant seront sélectionnés aléatoirement dans les villages de la commune avec une chance égale d'être choisie.

- *Explain in participant friendly language what your project aims to do and why you are doing it?*

This study aims to investigate the problem of double burden of malnutrition in households of the selected area. This will involve understanding the influence of socio-cultural practices, dietary habits and economic factors on the nutritional status of children and their mothers.
If you agree to participate, the interviewers will complete some questionnaires with your help. These questionnaires will focus on:

- Information about the household and its members,
- food consumed in the house, where it was sourced or bought and how much you consume.

Also, weight, height and waist circumference will be measured for participants. All information will be helpful to know the determinants of nutritional status of children and mothers to propose approaches for solutions to health policy. You will also have the advantage to know your weight, height and waist circumference and measures of your child.

Cette étude a pour but de caractériser le problème du double fardeau de la malnutrition dans les ménages de la commune choisie. Il s'agira de comprendre l'influence des pratiques

socio-culturelles, des habitudes alimentaires et des facteurs économiques sur le statut nutritionnel des enfants et de leurs mères.

Si vous acceptez de participer, vous nous aiderez en répondant à quelques questions. Ces questions auront rapport avec

- *Des informations sur le ménage et ses membres*
- *La consommation alimentaire de votre ménage, comment vous vous approvisionnez et quelle quantité vous consommez ?*

Aussi, le poids, la taille et le tour de taille seront mesurés pour tous les participants. Toutes les informations seront utiles pour connaitre les déterminants du statut nutritionnel des enfants et des mères pour proposer des approches de solutions aux politiques de santé. Vous aurez aussi l'avantage de connaitre votre poids, votre taille et votre tour de taille ainsi que les mesures de votre enfant.

Why have you been invited to participate?

- *Explain this question clearly.*

You have been chosen from the list of households given by the village head. Also, you have a child in the age of bracket considered. Each household in your village had the same chance of being selected to help us.

Vous avez été choisi sur la liste des ménages donnée par le chef de village. Aussi, vous avez un enfant de la tranche d'âge considérée. Chaque ménage de votre village a eu la même chance d'être sélectionnée pour nous aider.

What will your responsibilities be?

You will only have to answer honestly to our questions and let us take your measurements and those of your child.

Vous n'aurez qu'à répondre honnêtement à nos questions et à nous laisser prendre vos mesures et celles de votre enfant.

Will you benefit from taking part in this research?

- *Explain all benefits objectively. If there are no personal benefits, then indicate who is likely to benefit from this research e.g. future patients.*

You have no direct profits in this study. The results will be useful to improve the knowledge and allow us to work better with the authorities for improving the health of mothers and children. You are helping us to know more about your community patterns and how we can help you to improve your health.

Vous n'avez pas de bénéfices directs dans cette étude. Les résultats seront utiles pour améliorer les connaissances et nous permettre de mieux travailler avec les autorités pour améliorer la sante des mères et des enfants. Vous nous aidez à mieux connaitre les habitudes de votre communauté et savoir comment nous pouvons améliorer votre santé.

Are there in risks involved in your taking part in this research?
There are any risks for you to take part in this research

Il n'y a aucun risqué pour vous de participer à cette recherché

If you do not agree to take part, what alternatives do you have?
You are free to decline; you will just be excluded without any consequences to yourself

Vous êtes libre de refuser, vous serez juste exclu sans aucunes conséquences

Who will have access to your medical records?
All information collected will be treat as confidential and protected.

Toutes les informations collectées seront traitées confidentiellement et protégées Il y aura un code pour vos données et seul le chercheur y aura accès à vos détails personnels. Si la recherche est publiée, votre nom ne sera pas cité.

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

Taking part in this study will not cause no harm or injury to you. However, if something happens during study, the researcher will ensure you will be treat in the government hospital in the area.

Prendre part à cette étude vous ne serez soumis à aucun risque de dommages ou de blessures. Cependant, s'il vous arrivait quelque chose durant l'étude, le chercheur s'assurera que vous soyez soigné dans un des hôpitaux de l'Etat.

Will you be paid to take part in this study and are there any costs involved?
No you will not be paid to take part in the study and no costs will be incurred by you.

Non vous ne recevrez aucune compensation pour prendre part à cette étude et ne aussi payerez aucun frais.

Is there anything else that you should know or do?

- You can contact Prof Xikombiso Mbhenyane at tel …… if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study researcher.
- You will receive a copy of this consent form for your own records.

S'il y a autre chose que vous aimeriez savoir ou faire

- *Vous pouvez contacter le Professeur Xikombiso Mbhenyane au ……. si vous avez des inquiétudes ou autres.*
- *Vous pouvez appeler le comité d'éthiques au 021-938 9207 si vous avez des plaintes par rapport au chercheur.*
- *Vous recevrez une copie de votre lettre de consentement*

Declaration by participant

By signing below, I ……..……., agree to take part in a research study entitled *(*An investigation of social-cultural practices, the presence of the double burden of malnutrition, and mothers' and their children's eating patterns in Benin*)*.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

En signant ci-dessous, Moi ...., accepte prendre part à une étude de recherche intitulé (Une investigation sur les pratiques socio-culturelles, la présence du double fardeau de la malnutrition, et les habitudes alimentaires des mères et de leurs enfants au Bénin).

Je déclare que :

- *J'ai lu ou qu'on m'a lu ce formulaire d'information et de consentement et il est écrit dans une langue avec laquelle je suis à l'aise et confortable.*
- *J'ai eu la chance de poser des questions et toutes mes questions ont reçu une réponse adéquate.*

  Je comprends que la participation à cette étude est volontaire et je n'ai pas été mis sous pression à y prendre part.
- *Je peux choisir de quitter l'étude à tout moment et ne sera pas pénalisé ou lésé d'aucune façon.*
- *Il peut m'être demandé de quitter l'étude avant la fin, si le médecin ou le chercheur estime qu'il l'est dans mes intérêts, ou si je ne suis pas le plan d'étude, comme convenu.*

Signed at (*place*) .....…..……. on (*date*) ……...…….. 2016.

....

Signature of participant Signature of witness

Declaration by investigator

I, ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Je……..déclare que:

- *J'ai expliqué les informations contenues dans ce document à ..... ……*
- *Je l'ai encouragé à poser des questions et à prendre suffisamment de temps pour y répondre.*
- *Je suis convaincu qu'il / elle comprend de manière adéquate tous les aspects de la recherche, tel que discuté ci-dessus*
- *Je n'ai pas utilisé d'interprète. (Si un interprète est utilisé, l'interprète doit signer la déclaration ci-dessous.*

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2016.

....

Signature of investigator Signature of witness

Declaration by interpreter

I *(name)* ……..…… declare that:

- I assisted the investigator (*name*) ……. to explain the information in this document to (*name of participant*) ……..…….. using the language medium of ……./……..(languages)
- We encouraged him/her to ask questions and took adequate time to answer them.
- I conveyed a factually correct version of what was related to me.
- I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Je, ……, déclare que:

- *J'ai aidé l'enquêteur (nom) .....pour expliquer l'information contenue dans le présent document à (nom du participant) .....en utilisant la langue du milieu..... / .....(Langues)*
- *Nous l'avons encouragé à poser des questions et à prendre suffisamment de temps pour y répondre.*
- *J'ai transmis une version correcte des faits qui m'ont été relatés.*
- *Je suis satisfait que le participant comprenne parfaitement le contenu de ce document de consentement éclairé et a eu de réponses satisfaisantes à toutes ses questions.*

Signed at (*place*) .....…..…….. on (*date*) ……...……2016

....
Signature of interpreter Signature of witness

APPENDIX 8: Ethics approval letter

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jou kennisvennoot • your knowledge partner

Approved with Stipulations
New Application

02-Dec-2016
Amoussou Lokossou, Yrence YUH

Ethics Reference #: S16/10/211

Title: **An investigation of social-cultural practices, the presence of the double burden of malnutrition, and mothers' and their children's eating patterns in Benin**

Dear Miss Yrence Amoussou Lokossou,

The **New Application** received on **25-Oct-2016**, was reviewed by members of **Health Research Ethics Committee 1** via Expedited review procedures on **30-Nov-2016**.

Please note the following information about your approved research protocol:

Protocol Approval Period: **02-Dec-2016 -01-Dec-2017**

The Stipulations of your ethics approval are as follows:
You will also need ethics approval from a local ethics committee in the country where the research will be conducted.

Please remember to use your **protocol number** (**S16/10/211**) on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:
Please note a template of the progress report is obtainable on www.sun.ac.za/rds and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.
Translation of the consent document to the language applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372
Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwc.gov.za Tel: +27 21 483 9907) and Dr Helene Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.
For standard HREC forms and documents please visit: www.sun.ac.za/rds

If you have any questions or need further assistance, please contact the HREC office at .

Included Documents:
11 XIKOMBISO MBHENYANE SHORT CV Sep 2016.pdf
10 CV_yrence Amoussou.pdf
5 Yrence proposal_last version 17oct 2016.pdf
8 Mbhenyane Investigator Declaration V4.2 (Eng).pdf
3 General Checklist(Eng)_V2.1 April 2016.pdf
2 Application Form.pdf
4 Synopsis Protocol_yrence Amoussou.pdf
1 Cover letter.pdf
12 CV_azandjeme_English_oct 2016.pdf
7 Yrence Lokossou Declaration.pdf
6 Appendices 1 - 8 all_english_french_yrence Amoussou.pdf
9 Azandjeme_20150224 Investigator Declaration V4.2 (Eng).pdf

Sincerely,

Franklin Weber
HREC Coordinator
Health Research Ethics Committee 1

Investigator Responsibilities

Protection of Human Research Participants

Some of the responsibilities investigators have when conducting research involving human participants are listed below:

1.Conducting the Research. You are responsible for making sure that the research is conducted according to the HREC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research.

2.Participant Enrolment. You may not recruit or enrol participants prior to the HREC approval date or after the expiration date of HREC approval. All recruitment materials for any form of media must be approved by the HREC prior to their use. If you need to recruit more participants than was noted in your HREC approval letter, you must submit an amendment requesting an increase in the number of participants.

3.Informed Consent. You are responsible for obtaining and documenting effective informed consent using **only** the HREC-approved consent documents, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least fifteen (15) years.

4.Continuing Review. The HREC must review and approve all HREC-approved research protocols at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period**. Prior to the date on which the HREC approval of the research expires, **it is your responsibility to submit the continuing review report in a timely fashion to ensure a lapse in HREC approval does not occur**. If HREC approval of your research lapses, you must stop new participant enrolment, and contact the HREC office immediately.

5.Amendments and Changes. If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, number of participants, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the HREC for review using the current Amendment Form. You **may not initiate** any amendments or changes to your research without first obtaining written HREC review and approval. The **only exception** is when it is necessary to eliminate apparent immediate hazards to participants and the HREC should be immediately informed of this necessity.

6.Adverse or Unanticipated Events. Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research-related injuries, occurring at this institution or at other performance sites must be reported to the HREC within **five (5) days** of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the HRECs requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch Universtiy Health Research Ethics Committee Standard Operating Procedures www.sun025.sun.ac.za/portal /page/portal/Health_Sciences/English/Centres%20and%20Institutions/Research_Development_Support/Ethics/Application_package All reportable events should be submitted to the HREC using the Serious Adverse Event Report Form.

7.Research Record Keeping. You must keep the following research-related records, at a minimum, in a secure location for a minimum of fifteen years: the HREC approved research protocol and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the HREC

8.Reports to the MCC and Sponsor. When you submit the required annual report to the MCC or you submit required reports to your sponsor, you must provide a copy of that report to the HREC. You may submit the report at the time of continuing HREC review.

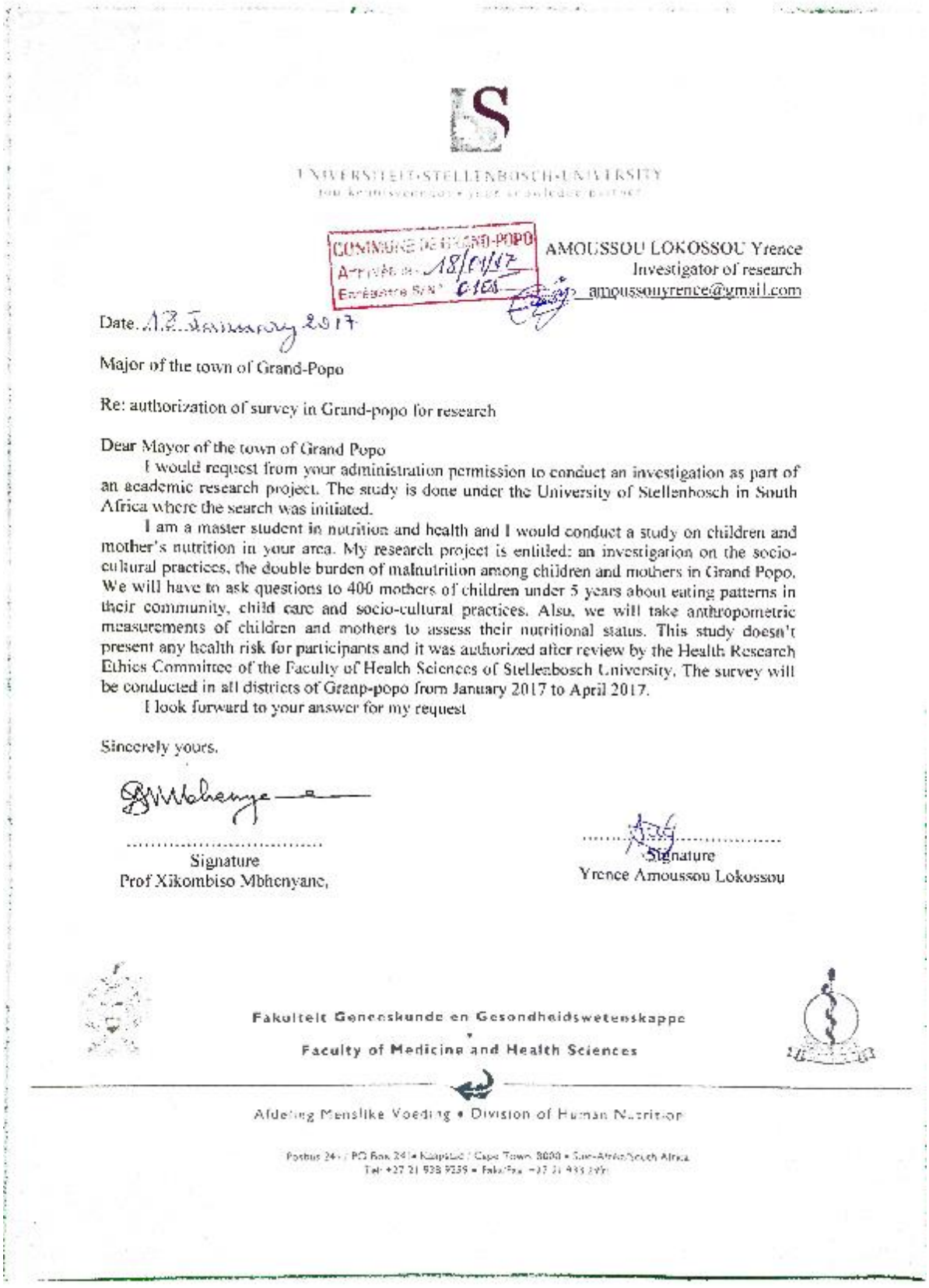
9.Provision of Emergency Medical Care. When a physician provides emergency medical care to a participant without prior HREC review and approval, to the extent permitted by law, such activities will not be recognised as research nor will the data obtained by any such activities should it be used in support of research.

10.Final reports. When you have completed (no further participant enrolment, interactions, interventions or data analysis) or stopped work on your research, you must submit a Final Report to the HREC.

11.On-Site Evaluations, MCC Inspections, or Audits. If you are notified that your research will be reviewed or audited by the MCC, the sponsor, any other external agency or any internal group, you must inform the HREC immediately of the impending audit/evaluation.

APPENDIX 9: Permission letters

- from the major of the Town



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COMMUNE DE GRAND-POPO
Arrivée le : 18/01/17
Enregistré sous n° 0105

AMOUSSOU LOKOSSOU Yrence
Investigator of research
amoussouyrence@gmail.com

Date. 12 January 2017

Major of the town of Grand-Popo

Re: authorization of survey in Grand-popo for research

Dear Mayor of the town of Grand Popo

I would request from your administration permission to conduct an investigation as part of an academic research project. The study is done under the University of Stellenbosch in South Africa where the search was initiated.

I am a master student in nutrition and health and I would conduct a study on children and mother's nutrition in your area. My research project is entitled: an investigation on the socio-cultural practices, the double burden of malnutrition among children and mothers in Grand Popo. We will have to ask questions to 400 mothers of children under 5 years about eating patterns in their community, child care and socio-cultural practices. Also, we will take anthropometric measurements of children and mothers to assess their nutritional status. This study doesn't present any health risk for participants and it was authorized after review by the Health Research Ethics Committee of the Faculty of Health Sciences of Stellenbosch University. The survey will be conducted in all districts of Grand-popo from January 2017 to April 2017.

I look forward to your answer for my request

Sincerely yours.

Signature
Prof Xikombiso Mbhenyane,

Signature
Yrence Amoussou Lokossou

Fakulteit Geneeskunde en Gesondheidswetenskappe
Faculty of Medicine and Health Sciences

Afdeling Menslike Voeding • Division of Human Nutrition

Posbus 241 / PO Box 241 • Kaapstad / Cape Town 8000 • Suid-Afrika/South Africa
Tel: +27 21 938 9259 • Faks/Fax: +27 21 933 2972

-from the head doctor of the district

Vu le 18/01/2017

ZONE SANITAIRE DE GRAND POPO
LE MEDECIN CHEF
ATIOGBE Hector
Tel 95526222/ 96314652

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your knowledge partner

AMOUSSOU LOKOSSOU Yrence
investigator of research
amoussouyrence@gmail.com

Date: 16 January 2017

Head doctor of Grand popo

Re: Survey in Grand-popo for research

Dear Head doctor of Grand popo

I would inform your administration that I would conduct an academic research project in your administrative area. The study is done under the University of Stellenbosch in South Africa where the search was initiated.

I am a master student in nutrition and health and I would conduct a study on children and mother's nutrition in your area. My research project is entitled: an investigation on the socio-cultural practices, the double burden of malnutrition among children and mothers in Grand Popo. We will ask questions to 400 mothers of children under 5 years about eating patterns in their community, child care and socio-cultural practices. Also, we will take anthropometric measurements of children and mothers to assess their nutritional status. This study doesn't present any health risk for participants and it was authorized after review by the Health Research Ethics Committee of the Faculty of Health Sciences of Stellenbosch University. The survey will be conducted in all districts of Granp-popo from January 2017 to April 2017.

I look forward to your answer for my request

Sincerely yours.

Signature

Xikombiso Mbhenyane
Professor and Head of Human Nutrition Division
xgm@sun.ac.za; Tel: 021 9389135; Fax: 021 9332991

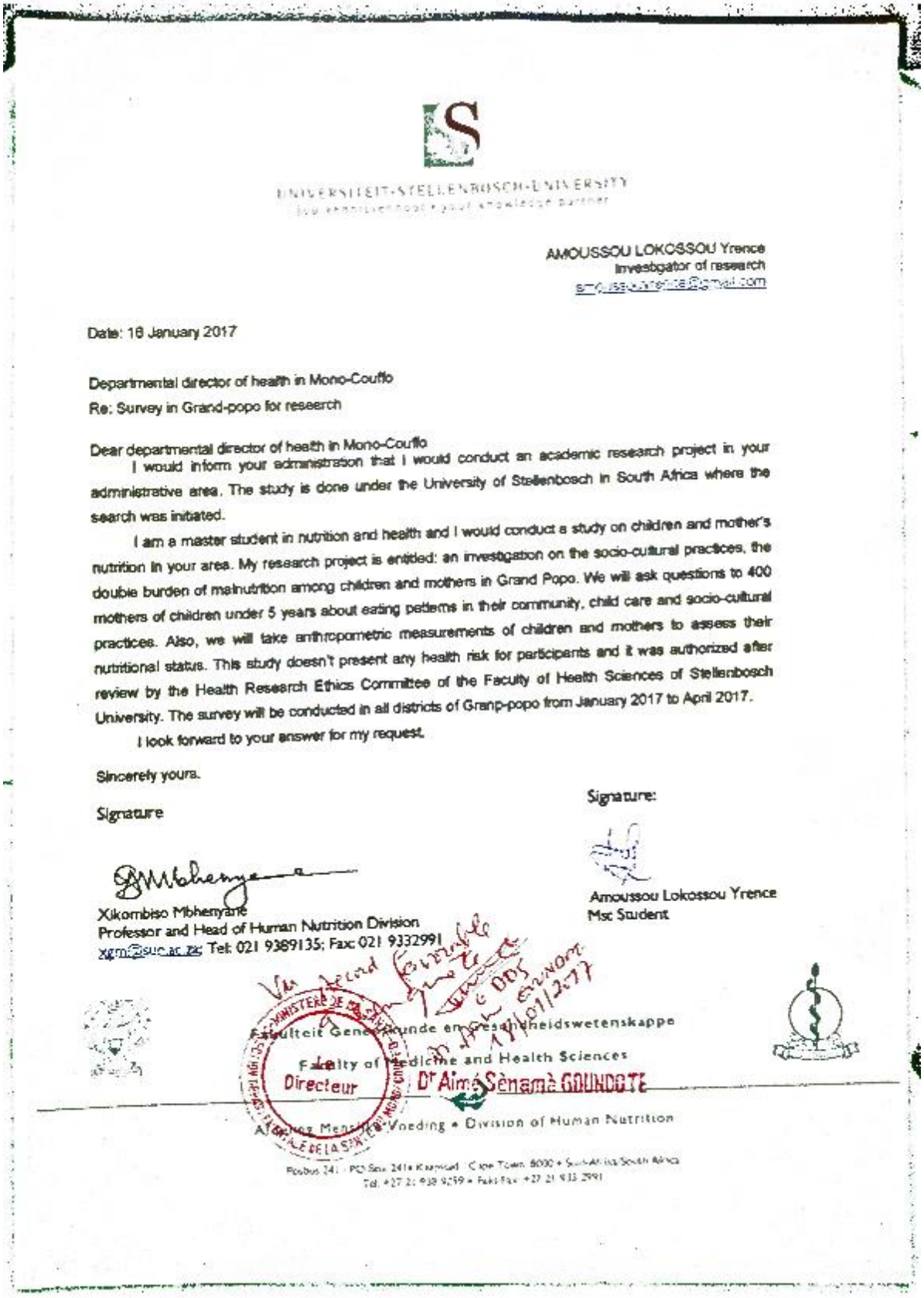
Signature:

Amoussou Lokossou Yrence
Msc Student

Fakulteit Geneeskunde en Gesondheidswetenskappe
Faculty of Medicine and Health Sciences

Afdeling Menslike Voeding • Division of Human Nutrition

-from the departmental director of health



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AMOUSSOU LOKOSSOU Yrence
Investigator of research
s[illegible]@gmail.com

Date: 18 January 2017

Departmental director of health in Mono-Couffo

Re: Survey in Grand-popo for research

Dear departmental director of health in Mono-Couffo

I would inform your administration that I would conduct an academic research project in your administrative area. The study is done under the University of Stellenbosch in South Africa where the search was initiated.

I am a master student in nutrition and health and I would conduct a study on children and mother's nutrition in your area. My research project is entitled: an investigation on the socio-cultural practices, the double burden of malnutrition among children and mothers in Grand Popo. We will ask questions to 400 mothers of children under 5 years about eating patterns in their community, child care and socio-cultural practices. Also, we will take anthropometric measurements of children and mothers to assess their nutritional status. This study doesn't present any health risk for participants and it was authorized after review by the Health Research Ethics Committee of the Faculty of Health Sciences of Stellenbosch University. The survey will be conducted in all districts of Granp-popo from January 2017 to April 2017.

I look forward to your answer for my request.

Sincerely yours.

Signature

Xikombiso Mbhenyane
Professor and Head of Human Nutrition Division
xgm@sun.ac.za Tel: 021 9389135; Fax: 021 9332991

Signature:

Amoussou Lokossou Yrence
Msc Student

Fakulteit Geneeskunde en Gesondheidswetenskappe
Faculty of Medicine and Health Sciences
Directeur
Dr Aimé Sènamè GOUNDOTE
Afdeling Menslike Voeding • Division of Human Nutrition